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ON RECENT IMPROVEMENTS IN THE METHODS FOR THE MANUFACTURE OF CHLOROFORM.

By Samuel P. Sadtler, Ph. D.

It is of course within the knowledge of the drug and chemical trade that along in the fall of 1885, a notable reduction in the price of chloroform took place, and that this reduction has been practically maintained since. Such a change indicates that either there has been a notable cheapening of the raw material of manufacture, a decided improvement in existing methods or the introduction of an entirely new method for the manufacture of the staple so cheapened. In the case of chloroform, it has been the latter.

The old process of manufacture by the action of bleaching powder upon alcohol has given way to what is now termed the "acetone" process. This is not, however, a new discovery. Liebig, in 1832, in following up his first account of the properties of the newly discovered "chloride of carbon" (chloroform), mentions that it can be gotten in very large quantities by the action of bleaching powder upon "pyro-acetic spirit" (acetone) as well as from alcohol. That alcohol has all this time been preferred to acetone as a material from which to prepare chloroform, is due mainly to the fact that only in recent years has acetone been prepared pure in quantity, but also to the erroneous statement of Siemerling quoted in the works of reference like Watts' Dictionary of Chemistry that only 33 per cent. of chloroform could be gotten from acetone by the action of bleaching powder. Now that acetone is made on a large scale, and of extreme purity, and it has been shown that it is the richest chloroform-yielding substance known (206 per cent. by theory and 200 per cent. in practice at times), the case

assumes a different aspect. Indeed, as was testified by one of the witnesses in the recent patent litigation on this subject (Michælis *vs.* Roessler), this process "is one of great importance to the manufacturers of chloroform, and of great value to the public for the reason that it enables the production of chloroform at a price which is nearly one-half its cost by any other method practiced by manufacturing chemists or known by me."

The writer, having had opportunity to thorougly study the new process in practice, desires to give an outline sketch of this recent revolution in the manufacture of so important a chemical as chloroform.

The manufacture of a purer grade of acetone than that then in use for solvent purposes having been begun in Germany in 1881 on the part of the "Verein für Chemische Industrie," Liebig's old suggestion for the manufacture of chloroform from acetone was taken up by the "Verein Chemischer Fabriken," Mannheim, Germany, in the beginning of 1882 and a year later by the first mentioned company which made the acetone for both. In June, 1884, Mr. F. Roessler of the present Roessler & Hasslacher Chemical Company, of New York, visited Germany and studied the process, which his company are now carrying out under the the patents of Gustav Rumpf to be described later. In the meantime Prof. G. Michaelis of Albany obtained in July, 1885, (application filed Nov. 18, 1884) a patent for distilling crude acetate of lime (preferably, as the patent says, crude "brown acetate of lime") and using the liquid products of their distillation in connection with a hypochlorite for the manufacture of chloroform. Under this patent suit was brought against Roessler & Hasslacher for infringement. After protracted litigation, Judge Butler of the U. S. Circuit Court has just decided that in using pure acetone alone the defendants were using an old and well-known process and were not guilty of infringement. As both the production of pure acetone and the method of manufacture of chloroform are covered by patents issued in this country, the processes can be given in outline as there published.

The raw material with which the beginning is made is the "gray acetate of lime." While this is distinctly purer than "brown acetate" it still contains both moisture and tarry matter. To free it from these and to raise the percentage of actual acetate of lime, it is carefully roasted before being submitted to dry distillation. This roasting forms the subject of patent No. 393,079, issued to Gustav Rumpf, of Frankfort, Germany, and assigned to Roessler and Hasslacher, of New York. As

shown in Fig. 1, it is done in a series of three slightly-inclined cylindrical retorts, in which the material is continually pushed forward by revolving blades. The crude gray acetate is dropped in at *a* and passes along the length of the upper retort until it drops upon the blades which revolve in the second retort, and passing along this is dropped into the third or lowest retort, from which it issues at *g*, and is collected in suitable vessels. As seen in the illustration, the inclination of these three retorts is different, so that the material passes along most rapidly as it descends into the hottest retort below. At *e* and *f* are connections with the flue, through which the moisture and

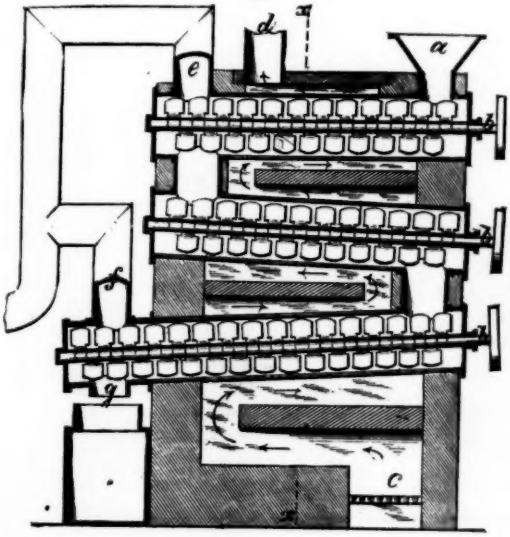

FIG. 1.

tarry vapors can pass off. By this continuous roasting process, the crude material can be purified without notable decomposition of the true acetate. The second patent, No. 385,777, issued to the same and assigned to the same, refers to the method of distilling the roasted gray acetate. Here, to secure the maximum yield of acetone, the points to be attained are uniformity of temperature throughout the whole mass and slow heating to not over 300° C. The patentee claims that "in the process of subjecting acetates in a closed vessel to heat applied externally to the vessel for distilling acetone from the acetates, the desired slowness and uniformity of temperature may be

secured by stirring the acetates so that all portions of the mass will be subjected to the heat resulting from direct contact with the bottom of the vessel and by admitting free steam from time to time into direct contact with the acetates in case of any undesirable rise in temperature within the vessel."

Fig. 2 shows the form of retort in which this is effected. It will be seen mechanical agitation is provided for by the paddles which rotate around the vertical central axis. Steam is admitted by one of the openings above, while the products of distillation pass off by

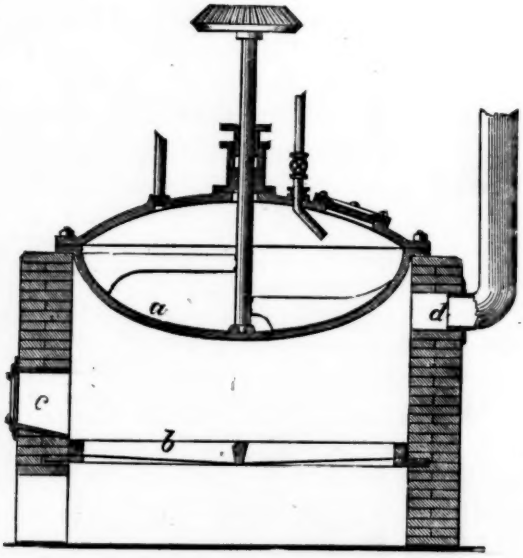

FIG. 2.

another opening in the top of the retort. The crude acetone distillate so obtained while richer than before in real acetone still contains oily distillation products and much water from condensed steam. In this dilute state it is treated with milk of lime to remove the higher ketones and other compounds. It is then distilled from a large plain still and the fractions rich in acetone passed to a column-still where it is rectified until it becomes almost if not quite anhydrous. In practice, two column-still rectifications are carried out, one after the other, so that the pure acetone shows 99° or 100° by the alcoholometer. It is now fitted for use in the direct manufacture of chloroform. The

process and form of apparatus for most successfully carrying out this chloroform manufacture constitute the subject of U. S. patent, No. 383,992, also issued to G. Rumpf, and assigned to Rœssler and Hasslacher. The patentee first states that in order to get the full yield of chloroform it is necessary to take a much larger proportion of bleaching powder than that given in Watts' Dictionary of Chemistry, Vol. I., page 918, and states that for 58 pounds of acetone at least 600 pounds of chloride of lime of thirty-five per cent. available chlorine are necessary. The yield will then be from 150 to 180 per cent. of the weight of the acetone employed instead of about 33 per cent.

The construction of the still and connections are shown in Fig. 3. The still having been filled to a proper height with water, as shown in the cut, the charge of bleaching powder is introduced and the man-

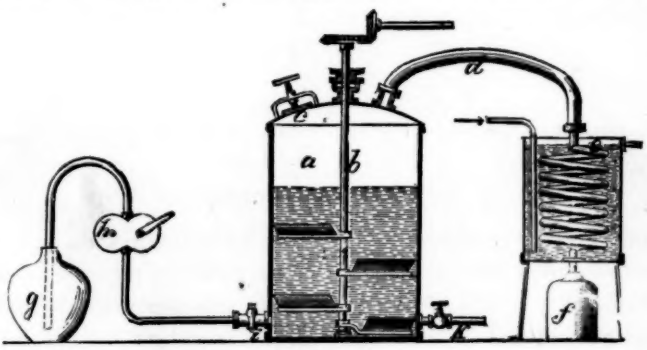

FIG. 3.

hole *c* closed with cement. The agitators having been started by means of the revolving shaft *b*, the acetone, previously diluted, is pumped in gradually at *i*. As it enters, it rises and reacts with the bleaching powder solution and the chloroform produced distills spontaneously from the delivery tube *d*, passes through the condenser *e* and is collected under water at *f*. The introduction of the diluted acetone is to be effected at intervals only, otherwise some acetone will distill over unchanged, or the reaction will become too violent and much frothing ensue. When the delivery of chloroform begins to slacken, steam is gradually introduced to heat up the mixture and drive over the last portions of the chloroform which remain. The contents of the still are then discharged through the outlet *k* into the drain. They consist of very dilute calcium acetate solution mixed with calcium hydrate and calcium chloride.

The reaction for this production of chloroform from acetone seems to be simply:

$2C_3H_6O+6CaOCl_2=2CCl_3H+Ca(C_2H_3O_2)_2+2Ca(OH)_2+3CaCl_2$.

This would demand one equivalent of chloroform for one of acetone used, or 206 parts of chloroform by weight reckoned on the weight of the acetone. In practice 180 parts are usually obtained, although 200 parts have actually been obtained at times.

The chloroform obtained is quite free from the chlorinated side products which often accompany the chloroform made from alcohol. It is, nevertheless, thoroughly purified by treatment with sulphuric acid and careful washing, and it is then brought exactly to the U. S. Pharmacopœia standard.

HYPOPHOSPHOROUS ACID AND THE OFFICINAL HYPOPHOSPHITES.

By Frank X. Moerk, Ph. G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.—No. 55.

I. METHODS OF ESTIMATION.

In taking up the above subjects for examination, the renown of hypophosphorous acid and its salts as reducing agents rendered it very likely that abundant evidence of this property would be had in finding the acid and its salts changed, partly at least, into phosphorous acid and phosphites, consequently, the determination of these last bodies in presence of the former was of considerable importance.

Looking over the reactions of the two acids there are to be found only three tests by which hypophosphorous acid can be distinguished from phosphorous acid, and, possibly, only one by which phosphorous acid can be distinguished from hypophophorous acid. Hypophosphites: 1, heated with cupric sulphate solution give a precipitate of cuprous hydride which, on boiling, is decomposed into metallic copper and hydrogen[1]; 2, with a nitric acid solution of ammonium molybdate produce no change until a few drops of sulphurous acid are added, when a beautiful blue color results[2]; with ammonium tungstate, under same conditions, also a blue color[3]; phosphites, in pres-

[1] Wurtz: Elements of Chemistry.
[2] Amer. Journ. Phar., 1889, 129.
[3] Amer. Journ. Phar., 1889, 130.

ance of acetic acid, cause a white precipitate with lead acetate.[1] These tests, however, appear to be valueless for quantitative estimations.

To estimate hypophosphites the same methods[2] are recommended as for the estimation of phosphites; they are two in number: 1, Conversion of the acids or salts into phosphoric acid or phosphate, estimating this and calculating then to the acid or salt used; 2, Determination of the reducing action by use of mercuric chloride in excess, weighing the mercurous chloride formed, and calculating to original substance. While these methods give good results, if working with pure substances, no mention is made of the determination of both in a mixture.

By carefully studying these two methods the following process was devised, for a correct understanding of which the essential reactions are first given:

$$H_3PO_2+4HgCl_2+2H_2O=H_3PO_4+2Hg_2Cl_2+4HCl \text{ and}$$
$$2H_3PO_3+4HgCl_2+2H_2O=2H_3PO_4+2Hg_2Cl_2+4HCl.$$

It will be seen that hypophosphorous acid, H_3PO_2, has twice the reducing action of phosphorous acid, H_3PO_3; hence, should H_3PO_3 be present with H_3PO_2, two molecules H_3PO_3 will always be expressed as one molecule H_3PO_2. By oxidation, however, the two molecules of H_3PO_3 will form two molecules of H_3PO_4, which by the first method will then be calculated as two molecules of H_3PO_2; so by this determination a larger amount of H_3PO_2 will be obtained compared with that found by the reducing action, and this excess will represent one molecule of H_3PO_2 formed from two molecules of H_3PO_3; the calculation as H_3PO_3 can then be made by the proportion:

$$H_3PO_2 : 2\ H_3PO_3 : : \text{the difference} : x.$$

A better method of determining the reducing action it was thought could be found by using an acid solution of permanganate of potassium; this method[3] has at various times been mentioned as a good one for the estimation of hypophosphites, but matters apparently rested with the mentioning, as no account of the details could be found after a careful search. In the following experiments calcium hypophosphite was used; the $K_2Mn_2O_8$ solution was made by dissolving 5 gm. in a liter of distilled water, and this solution was standardized by means of the normal solution of oxalic acid. From 0·1 to 0·2 gm.

[1] Fresenius: Qualitative Analysis.
[2] Watts' Dictionary of Chemistry.
[3] Amer. Journ. Pharm., 1882, 138 and 1887, 246.

$Ca(H_2PO_2)_2$ were dissolved in 50 cc. water, 10 cc. dilute sulphuric acid (1–5) added, and the $K_2Mn_2O_8$ allowed to run in from a burette; at first decolorization occurred, but after about one-half of the calculated $K_2Mn_2O_8$ had been added the solution became of a red color, and then rapidly, on further addition, deposited a dark brown precipitate of hydrated manganese dioxide. Repeating this experiment a number of times with larger quantities of sulphuric acid, also by application of gentle heat, no better results were obtained. Thinking that the reducing action would progress more favorably, if a ferric salt was present, in that this would be reduced to ferrous salt which, by addition of $K_2Mn_2O_8$, could be easily oxidized to the ferric condition, an addition of an excess of ferric sulphate solution was made, and after boiling and allowing to cool somewhat the $K_2Mn_2O_8$ added; the results obtained by this modification did not differ materially from those previously mentioned. It may be opportune to here mention the peculiarity of hypophosphorous acid; it is a good reducing agent toward permanganate of potassium and ferric salts, until by this action it has been changed into phosphorous acid, then this acid reduces permanganate only to the condition of hydrated manganese dioxide, the ferric salt, even upon boiling, being very slowly, if at all, reduced by it. The proof of this last assertion was obtained by boiling the hypophosphite with ferric chloride in moderately dilute acid solution until no further decolorization took place, then adding an excess of ferric chloride (sufficient to impart a decided color) and boiling for one hour; by addition of ammonia the iron was precipitated; the filtrate strongly reduced mercuric chloride and silver nitrate solutions; the washings of the precipitate for a long time reduced silver nitrate, indicating the presence of a salt of a reducing acid which could only be a phosphite; the precipitate was dissolved in nitric acid and solution of molybdate of ammonium added, after heating for some time to 40°C. the mixture deposited so little precipitate, that it was possibly due to a small quantity of phosphite, which was not completely removed by washing, and which, by the action of the nitric acid, was converted into phosphate. From these experiments the formation of phosphoric acid from hypophosphorous acid does not take place until the hypophosphorous acid has been completely converted into phosphorous acid.

After understanding the peculiarities of the two acids, and their

salts, the following manipulation gave very good results with $Ca(H_2PO_2)_2$: 0·1 to 0·2 gm. are dissolved in 50 cc. water, 10 cc. dilute sulphuric acid and sufficient $K_2Mn_2O_8$ added until the liquid above the precipitated hydrated manganese dioxide has a distinct purple color; the mixture is heated to 60°C. for one-half hour, should the supernatant liquid become colorless more $K_2Mn_2O_8$ must be added. By addition of a measured quantity of normal oxalic acid solution the excessive $K_2Mn_2O_8$, as well as the MnO_2 H_2O, is reduced and a colorless liquid results; to this is now added sufficient $K_2Mn_2O_8$ to produce a permanent pink color. From the total $K_2Mn_2O_8$ added is subtracted that quantity which is required by the oxalic acid, the remainder being the quantity necessary to oxidize the hypophosphite.

$$\underset{850}{5Ca(H_2PO_2)_2} + \underset{1264}{4K_2Mn_2O_8} + 12H_2SO_4 = 5CaH_4(PO_4)_2 + 4K_2SO_4 + 8MnSO_4 + 12H_2O.$$

$$\underset{630}{5H_2C_2O_4.\ 2H_2O} + \underset{316}{K_2\ Mn_2O_8} + 3H_2SO_4 = 10CO_2 + 18H_2O + K_2SO_4 + 2MnSO_4.$$

316 parts $K_2Mn_2O_8$ are the equivalent of 630.0 parts $H_2C_2O_4.2H_2O$
" " " " " " 212·5 " $Ca(H_2PO_2)_2$
" " " " " " 165·0 " H_3PO_2
" " " " " " 260·2 " KH_2PO_2
" " " " " " 220·0 " NaH_2PO_2
" " " " " " 209·1 " $Fe_2(H_2PO_2)_6$

While with $Ca(H_2PO_2)_2$ very good and constant results were obtained, the method applied to the examination of KH_2PO_2 and NaH_2PO_2 was not very satisfactory, this being probably due to the presence of chlorides in these salts; the test carried out in neutral and alkaline solutions gave no better results.

The mercuric chloride method was now the one which had to be relied upon for the reducing action in all cases; some experiments were made to find the best conditions. If mercuric chloride, in excess, be added to a neutral solution of a hypophosphite there is formed, in the cold, slowly a precipitate of mercurous chloride, heating promotes the precipitation, but even then it requires several hours for complete precipitation; the addition of 1 per cent. HCl hastens the precipitation which is complete after heating in a waterbath for thirty to forty-five minutes; the presence of 15 per cent. HCl causes the greater

part of the reduction to take place in the cold in a few minutes, but heating in a waterbath for twenty to thirty minutes is essential for complete precipitation. As Hg_2Cl_2 is liable to change by heating with moderately strong HCl, the following manner of employing the test was used: 0·2 to 0·3 gm. of the hypophosphite were dissolved in 25 cc water (ferric hypophosphite formed an exception to this method; for details see that compound), 1 cc HCl and 75 cc of a saturated solution of mercuric chloride added, heated in a waterbath for 45 to 60 minutes, filtered through a weighed filter, and the filtrate heated to the boiling point for several minutes; if no further precipitation takes place, the precipitate is well washed with boiling water, dried at 100° and weighed. Should a precipitate form the heating must be continued for fifteen minutes and filtration repeated. A large number of determinations made by this method did not furnish a single case in which a second precipitation occurred.

The weight of mercurous chloride multiplied by the following factors (obtained by writing the reactions and dividing the molecular weights of the hypophosphites by the amount of Hg_2Cl_2 formed from them), will give the amount of the hypophosphite:

For	H_3PO_2	multiply by	0·070183
"	NaH_2PO_2	" "	0·093577
"	KH_2PO_2	" "	0·110697
"	$Ca(H_2PO_2)_2$	" "	0·090387
"	$Fe_2(H_2PO_2)_6$	" "	0·088934

The second part of the determination consists in oxidizing the hypophosphite and estimating the phosphoric acid formed; experiments proved that bromine is the best oxidizing agent that can be used. From 0·2 to 0·3 gm. of the hypophosphite are dissolved in 50 cc. water, a few drops bromine added and, after covering the beaker, moderate heat applied; should the solution become colorless, more bromine must be added and the heating continued; after the solution has retained the bromine color for half an hour, it is heated to the boiling point, and by occasionally lifting the cover the bromine vapors are allowed to dissipate. An excess of ammonium hydrate is now added, and if a precipitation of phosphate occurs (as there will be if the calcium or ferric salt has been used or, if in the preparation of the alkaline hypophosphites all of the calcium salt was not decomposed) an ammoniacal solution of ammonium citrate is added to redissolve the precipitate before the addition of magnesia mixture is made. From the

weight of the magnesium pyrophosphate the hypophosphite can be calculated by use of the factors:

For	H_3PO_2	multiply by	0·5946
"	NaH_2PO_2	" "	0·7928
"	KH_2PO_2	" "	0·9378
"	$Ca(H_2PO_2)_2$	" "	0·7658
"	$Fe_2(H_2PO_2)_6$	" "	0·7534

It is to be understood that if the salt examined contains phosphoric acid or phosphate this must be determined, and the amount of magnesium pyrophosphate due to it subtracted from the total magnesium pyrophosphate before the above calculations are made.

In writing out the reactions for the oxidation of hypophosphites and phosphites by means of bromine, it was noticed that by neutralizing with sodium hydrate, results identical with those from the reduction method with mercuric chloride were to be obtained.

$$NaH_2PO_2+(Br_2)_2+2H_2O=NaH_2PO_4+4HBr$$
$$2Na_2HPO_3+(Br_2)_2+2H_2O=2Na_2HPO_4+4HBr.$$

Both reactions yield products which will require for neutralization six molecules sodium hydrate; and, as in the case of the mercuric chloride method, two molecules phosphite will be calculated as one molecule hypophosphite. Should phosphite be present the hypophosphite deduced from the phosphoric acid determination will exceed that found by this volumetric method, the excess representing one molecule hypophosphite derived from two molecules phosphite.

This method will allow of a rapid determination of the reducing value and at the same time prepare the solution for the phosphoric acid estimation, thus combining the essential points in the analysis of the hypophosphites. The determination is effected as follows: 0·2 to 0.3 gm. of the hypophosphite are mixed with 100 cc. water in a covered beaker and bromine added, a few drops at a time, until the color no longer disappears even after application of a moderate heat; the excess of bromine is removed by boiling the solution until free from color (no fear need be entertained of a loss of acid as a very dilute acid solution, such as this, loses upon boiling only water until the acid becomes so concentrated as to contain 47 per cent. HBr), 15 cc. of a *neutral* 10 per cent. calcium chloride solution and a few drops of phenolphthalein solution added and then titrated with normal sodium hydrate. By multiplying the number of cc. of NaOH required by the following factors, which represent the quantities of hypophos-

phites corresponding to 1 cc. NaOH, the quantity of hypophosphite will be obtained:

For	$Ca(H_2PO_2)_2$	multiply by	0·014166
"	NaH_2PO_2	" "	0·014666
"	KH_2PO_2	" "	0·016850
"	$Fe_2(H_2PO_2)_6$	" "	0·013940

The sodium hydrate solution must be accurately standardized as a slight error will make a considerable difference if expressed as percentage of hypophosphite.

The addition of the calcium chloride is made to correctly indicate the reaction of the solution; phosphoric acid titrated with sodium hydrate solution will indicate an *alkaline* reaction before all of it has been changed into Na_2HPO_4, although this is an *acid* salt; by the addition of $CaCl_2$ there is formed the *acid* salt, $CaHPO_4$, which has an *acid* reaction, and which by addition of NaOH is changed into the normal calcium phosphate with neutral reaction.

This method must only be applied in neutral solutions; should the hypophosphite have an acid or alkaline reaction, the amount of acid or alkali required to neutralize must be ascertained and allowed for in the above method. For this reason hypophosphorous acid was not placed in the above list; its estimation is easily effected by subtracting the number of cc. of NaOH required for neutralization of the acid from the total number of cc. of NaOH required after oxidation with bromine and multiplying the remaining number of cc. of NaOH by 0·011.

The change of a pure hypophosphite into a phosphite must be attended by the production of an acid reaction for the reason that H_3PO_2 is a monobasic acid while the product of oxidation, H_3PO_3, is a diabasic acid, hence, a pure hypophosphite will not be able to neutralize the additional acidity. In the examination of hypophosphorous acid, the neutralization figures play an important part.

After using the various methods it is but proper to recommend the one found to be the best; this is undoubtedly the volumetric method after oxidation with bromine, for as accurate results as with the mercuric chloride method are obtained in one-fourth of the time. For a method to be carried out in a retail store, possibly the mercuric chloride would answer better as there are no objectionable vapors generated.

In the examination of the hypophosphorous acids and the hypophosphites probably more determinations were made with the mercuric chloride method, owing to the fact that most of the work had been done before the value of the volumetric method was recognized.

AN OLD SAMPLE OF CAMPHOR OIL.

By Henry Trimble and Hermann J. M. Schroeter.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 54.

Since the publication of our paper on oil of camphor in the June number of this Journal, page 273, we have been supplied with a sample which was bottled by the late Frederick Brown more than 50 years ago. At that time it was put up in 2 drachm bottles and sold at a high price for internal use. This sample resembled in physical properties the one exhibited by Prof. J. M. Maisch at the last pharmaceutical meeting (see page 315), and it is probable that both samples correctly represent the character of the oil imported at that time.

The sample from Mr. Brown which we will mark No. IX, had a deep yellow color, and possessed a pleasant camphoraceous odor. It began to boil at 178° C., had a sp. gr. of 0·9467 at 16° C., and possessed strong dextro-rotary power $= +66{\cdot}2°$ with a 200 mm. tube.

A 5 per cent alcoholic solution of the oil gave with 5 drops of saturated alcoholic solution of ferric chloride a green coloration. This coloration, we have since found, was also produced in the above proportions with oils I and II of our last paper, which however rapidly faded with sample No. I, while with No. II, it was more decided.

About 4 per cent. of camphor had crystallized out, and on cooling to somewhat below 0° C., the oil formed a mass of separated camphor. On distillation, this oil gave quite different results from any of the other samples examined.

One half litre was subjected to fractional distillation in a vacuum. When 25 per cent. had distilled over, camphor separated out, and continued so, until about 25 per cent. of the oil still remained in the *distilling* flask. On redistillation, the oil was found to contain the following definite fractions (the numbers correspond with those of the fractions of oil No. 1, page 282), in quantity as given:

		Boiling point.	Per cent.
(2).	From 158°–162° C.	159° C.	6·00
(3).	" 167°–169° C.	168° C.	9·00
(4).	" 170°–172° C.	171° C.	2·00
(5).	" 175°–177° C.	176° C.	11·00
(6).	" 180°–182° C.	180° C.	2·00
(7).	" 202°–206° C.	204° C.	52·00
(8).	" 212°–215° C.	213° C.	15·00
(11).	" 250°–270° C.		3 00

The lighter fractions of this oil are identical in boiling points with those obtained from No. 1 oil of our last paper, with exception of fraction (1) which was entirely absent; these lighter fractions however, exist only in one-half the quantity.

The large percentage of camphor is due no doubt to the ageing of the oil, having probably been originally present as the compound (8), camphorogenol. This compound (8) exists now in the oil to only one-half the amount it was present in No. I oil. Fraction (9), safrol, and (10), eugenol, could not be detected in this sample by any of the methods used for obtaining these compounds from No. I oil. A portion of the oil when shaken with concentrated aqueous solution of potassium hydrate, showed no separation of eugenate of potassium, and on addition of a mineral acid to this mixture, no odor of eugenol was developed. The odor of safrol was not detected in any of the methods used for treatment of the higher boiling fractions.

Fraction (11) possessed not the greenish blue color as from No. I oil, but had a very deep yellow color. It, however, gave Wallach's reaction for a sesquiterpene, with glacial acetic and concentrated sulphuric acids. The greenish blue oil detected in samples I and II was entirely absent from this sample. This fraction gave with an alcoholic solution of ferric chloride a brownish green coloration. This however was not due to eugenol, since we had evidence of its absence. (11) from No. I oil also gave this greenish coloration. Alcoholic ferric chloride added to fraction R, eugenol, from No. I oil, gave a blueish green coloration, which was decidedly different from that produced with fractions (11).

Fractions (2) to (6), inclusive, are no doubt identical with those obtained from No. I oil with the same boiling points, since their action on polarized light proved to be about the same.

The polariscope readings for (2), (3) and (5) with the 200 mm. tube were as follows, compared with No. I oil:

	No. IX Oil.	No. I Oil.
(2). From 158°–161° C.....	+54·2°	+54·°.
(3). " 167°–169° C.....	+57·2°	+56·9°.
(5). " 175°–177° C.....	+62·2°	+62·4°.

The absence of safrol and eugenol was also indicated by the strong dextro-rotary power this sample exerted on polarized light, being similar to samples III, IV and V, all of which consisted of a solution of camphor in the light fractions of camphor oil. This sample of oil

of camphor resembled the three last-named ones most, the difference being a larger percentage of camphor, with the addition of (8) camphorogenol, and (11), both in comparatively small amount only.

PHILADELPHIA, June 3d, 1889.

ABSTRACT OF REPORT PRESENTED BY COMMITTEE ON ADULTERATIONS AND DETERIORATIONS TO THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

A number of students in the Chemical Laboratory of the Philadelphia College of Pharmacy contributed their time to obtain some of the following results :—

Mr. Wm. Handler examined six samples of *Simple Syrup*, five of which were found close to the officinal requirements and one was decidedly inferior, containing only forty per cent. of sugar.

Mr. Charles A. Schwacke assayed light samples of *Household Ammonia*. This commercial article contained from 3.72 to 10 per cent. of ammonia—NH_3. Two of the samples contained borax.

Mr. Harry S. Wood determined the strength of *Glacial Acetic Acid*, and found two qualities in the market under that name, one containing about 80 and the other 99 to 100 per cent. of the absolute acid. The latter strength can always be gotten, generally with the percentage on the label, if the pharmacist is willing to pay the price. The absolute acid is easily recognized by its power to dissolve an equal volume of oil of lemon.

Mr. Charles E. McCloskey found powdered *Belladonna Root* from different wholesale druggists to yield from 0.2 to 0.4 per cent., and the *Leaves* 0.04 to 0.24 per cent. of alkaloid.

Mr. A. G. Hostetter, noticing the statement frequently made that *Potassium Tartrate* is often impure or adultrated, found all the samples from the manufacturers in this State to be very good, containing only traces of calcium salts, sulphuric, hydrochloric and carbonic acids.

Mr. G. M. Grosse found *Reduced Iron* to be of poor quality, one sample only answering to the requirements of the Pharmacopœia. They ranged from 18.43 to 88.40 per cent. The highest being of German and the lowest of French manufacture. Those of American make, being obtained from stock bottles of retail pharmacists, had, no

doubt, deteriorated by frequent exposure to the oxidizing action of the air.

Mr. O. Y. Owings determined the *Sodium Carbonate* and *Bicarbonate* of commerce to be of good quality, there being little or no difference between the English and American brands.

Mr. H. J. M. Schrœter (AM. JOUR. PHARM., December, 1888) has also shown that the commercial bicarbonate responds to the requirements of the Pharmacopœia for a pure salt.

Mr. Joseph Lowenberg examined five samples of *Morphine Sulphate*. All were found to be pure, but an English sample contained only 6·94 per cent. of water of crystallization, instead of 11·87 per cent. as allowed by the Pharmacopœia. A sample of *Morphine Acetate* was not easily dissolved in water, and yielded 1·81 per cent. of residue on ignition.

Mr. S. A. Wagaman assayed five samples of $\frac{1}{4}$-grain *Granules of Morphine Sulphate*. Finding that a small quantity of morphine was lost in the assay, he used as a check the amount of sulphuric acid found. In this way higher results were obtained than by the morphine assay, but still below what should have been in the samples. A single granule should contain $\frac{1}{4}$ or $\frac{25}{100}$ of a grain, there were found 20, 22, 18, 21, and 17 one hundredths of a grain respectively in the five samples. One hundred granules should contain 25 grains of morphine sulphate, but one sample only weighed 32 grains with the coating, two others weighed 36 grains each, thus showing that quality was sacrificed for elegance. These assays, which were repeated as well as compared with one made on a weighed quantity of the salt mixed with gum and sugar, indicate that pharmacists should exercise great caution in buying these granules.

Mr. Clarence S. Eldredge investigated the quality of twenty-five samples of *Lime Water* purchased of retail pharmacists in Philadelphia, and its vicinity. The results indicate gross carelessness in the making and keeping of this important preparation. Eight of the samples contained 0·15 per cent. of calcium hydrate, and were, therefore, equal to the pharmacopœia requirements, eight more were nearly up to the standard, and the remaining nine rapidly descended on the scale of strength to two which failed to show any alkaline reaction by litmus paper.

Four samples of *Balsam of Copaiba* were examined, one responded to all known tests of purity; two by the U. S. P. test showed gurjin

balsam, one of these also contained turpentine; the fourth sample was of a character that indicated adulteration, without one being able to determine exactly the nature of the admixture.

A sample of *Yellow Wax* was found to contain 50 per cent. of paraffin, thus indicating that this old trick has not been forgotten.

The adulteration of certain kinds of *Cream of Tartar* has nearly come to the point of being a recognized business. A sample from Altoona consisted largely of calcium phosphate. It scarcely charred when heated, thus indicating the absence of an organic substance like tartaric acid. Two samples from Pittsburgh did not char on heating, and were found to consist of calcium sulphate and phosphate.

One of the most glaring examples of willful substitution was some *Blue Ointment*, which by private information as well as chemical examination was found to be lard colored with Prussian blue.

Seventy-seven samples of *Laudanum* representing all parts of the State as well as New York City and Baltimore were assayed. Four were of full officinal strength. Nine more were near enough to come within the limits of reasonable error, and five failed to yield a weighable amount of morphine. The remaining fifty-nine may be classified as bad. Nearly all the poor samples were either the bottled preparation from country stores, or from manufacturers who supply this trade.

HENRY TRIMBLE, Philadelphia.
CHAS. D. LIPPINCOTT, Titusville.
T. W. LASCHEID, Pittsburgh.
Committee.

ON PHARMACEUTICAL ASSAYING.

BY AUGUST DRESCHER, PH. G.

Read before the New Jersey Pharmaceutical Association at Bridgeton, May 22.

It had been, originally, the intention of the writer, he well recognizing the importance of this branch of pharmacy, to contribute a series of papers on the subject of assaying crude drugs and their preparations, and, in this spirit, work was forthwith begun in his own laboratory, regular notes of personal observations being made and kept, the current literature on the matter being at the same time duly recognized, appreciated, and utilized, as a matter of course. The subject was to be treated of in regular classic order, and the first to be considered was to be "*Narcotica et similia.*" I had the pleasure at our

last year's meeting to bring my first contribution on "Opium and its preparations." It has since that time, however, been impossible for me to continue, as originally intended, this systematic work, owing to many disturbances, and so,—though very reluctantly,—I, for the time, have had to abandon it, to be taken up again with renewed vigor, however, as soon as time and opportunity shall permit.

The present paper will confine itself to the discussion of some drugs and preparations, with which the writer has been kept busy during the past year. In some of these cases the U. S. P. does not offer "tests," but the law allows the Board of Health to enforce conformity to some other standard in such a case, as, *e. g.*, United States Dispensatory, National Dispensatory, or even any other well qualified authority.

Paregoric, U. S. P.—Prepare a "standard" (strictly U. S. P., using standard ingredients!) for comparison with the suspected sample through the following tests:

1. *Acidity.*—20 cc. of sample dilute with 20 cc. diluted alcohol, titrate with $\frac{1}{10}n$NaHO solution, using phenolphthalein as indicator (*Drescher*). Standard paregoric, U. S. P., 1880, will consume 7–8.5 cc. $\frac{1}{10}n$NaHO.—*N. B.* A blank experiment with the diluted alcohol, used in the preparation, may be made, and allowance made for possible acidity of it.

2. *Sp. gr.* is approximately 0·925 to 0·935 (*Drescher*).

3. *Morphiometric assay* is not practicable.

4. *Meconic-Acid Determination:*—Allen's colorimetric method (especially for U. S. P. article) yields uncertain results. Drescher's modification yields fair results, thus: Evaporate 20 cc. of sample on water-bath with 1 gm. freshly ignited kaolin to 10 cc., filter, dilute filtrate with water to 20 cc., add 3 drops 10 per cent. ferric chloride solution, and compare coloration with that of the standard equally treated (*Drescher*).

5. *Foreign Colors:*—Caramel, red santal, cochineal are commonly employed; cudbear rarely. Solution of basic lead acetate precipitates cochineal, santal, and cudbear. The precipitate may be freed from lead by means of dilute sulphuric acid, and the color taken up by a suitable solvent and further tested. Caramel is best precipitated by kaolin (freshly ignited), shaken out with water, and evaporated, or, the tincture may be directly evaporated down, and the caramel found in the residue, as a black or brown, viscid, sweetish mass, after

washing with strong alcohol. Cochineal and caramel are insoluble in stronger ether, cudbear is slightly soluble, and santal-red is easily soluble. Caramel is insoluble in strong alcohol.

The colors can be further tested with diluted sulphuric acid; cochineal turns yellow, cudbear and santalum do not turn, or only very gradually. Caramel is not affected, but it is otherwise easily distinguished.

Any color fairly above that of the regular light-brown of the standard ought to condemn an article, so that the special examination for colors might be omitted.

6. *Amount of Alcohol.*—Dilute 50 cc. with 100 cc. water, add 3 gm. recently-ignited kaolin, filter in closed funnel (to rid of oil anise, etc., etc.), distil off 50 cc. and determine as usual.

N. B.—The distillate may still contain a little camphor, etc., but not enough to seriously affect the sp. gr. of it (*Drescher*).

Rhubarb.—Of the structural and general physical characters of the *whole* root it is needless *here* to "waste eloquence," while the "text books" are so elaborate in their description of this drug; but the "*powdered*" root merits special attention here.

1. *The physical properties* ought, of course, be noted, as compared with a sample of undoubted quality—best self-prepared.

2. *Amount of Extract*—(prepared with 45 per cent. weight alcohol) ought to be about 47 per cent. (*Hager*); 35–58 per cent. (*Drescher*), *minimum* and *maximum*.

3. *Ash.*—12–14 per cent. (*Drescher*); sometimes claimed to be much more (*e. g.*, 43 per cent. (?) Nat'l Disp.[1]).

4. *Chrysophanic acid.*—To be not less than 3 per cent. (*Hager*); 2·5 per cent. (*Drescher*).

5. *Foreign coloring matters.*—These are easily detected, according to their nature (aniline, coal-tar derivatives, curcuma, etc.); thus: anilines (or other coal-tar derivatives) may be shaken out with benzol, or other solvents, etc. Curcuma is certainly discovered by the methods proposed by Maisch and Howie [see *U. S. Disp.*, *Nat'l Disp.*, *Hager's Phar. Praxis*, etc.].

6. *Chrysophanic acid.*—10 grammes coarsely powdered rhubarb is

[1] 43.27 per cent. See *Pharmacographia*, 1st Edition, page 449; 2d Edit., p. 500.—Ash 3 to 43 per cent.; *Marmé*, *Pharmacognosie*, 1886, p. 86.—Aschengehalt steigt bis 40 pro cent., *Moeller*, *Pharmakognosie*, 1889, p. 319.—Editor Am. Jour. Phar.

to be extracted with about 100 cc. absolute alcohol, containing 4 per cent. of concentrated soda-solution, by means of gentle heat; evaporate to one-quarter volume, acidify with acetic acid, and exsiccate; the triturated residue is extracted with cold benzol. On evaporating this benzol solution the chrysophanic acid (with a little resin) will be in weighable condition.—*Method Hager.*

Exhaust the rhubarb with cold water, evaporate the solution, dry the residue, extract with benzol, evaporate the benzol solution, which on cooling, etc., will deposit the chrysophanic acid.—*Method Schlossberger.*

Take 5 grammes finely-powdered rhubarb, 1·5 grammes tartaric acid, mix thoroughly, introduce into a Tollen's apparatus, and repercolate with 50 cc. of chloroform at about 65–70° C., evaporate, take up with chloroform, evaporate and weigh as "chrysophanic acid."—*Method Drescher.*

N. B.—These methods, *all and each*, do not claim to isolate the pure "chrysophanic acid," but they are, nevertheless, serviceable enough for practical purposes.

Jalap.—We are all familiar with the U. S. P. process of preparing "Resina Jalapæ." We use it for assaying this drug, which owes its activity to the amount of resin in it. I have made numerous assays of jalap, but the U. S. P. method has often not given me satisfaction. The resin will sometimes not separate for days out of the water. I use the following method, devised by me: 5 grammes (No. 50 powder) jalap are mixed with an equal quantity of fine sand; transfer to a filter, add gradually 250 cc. of boiling water, keeping the filter in a hot water jacket; after draining and drying the filter, remove the dregs therefrom, cut out the residue-ringed zones of the filter, add to the dregs, digest the whole with 150 cc. hot alcohol, filter, wash filter with a little hot alcohol, evaporate filtrate to small bulk, transfer to small beaker, evaporate to dryness and weigh. The resin is then further tested as usual for its purity. (See U. S. P.) The U. S. P. claims 12 per cent. of resin, the Ph. Germ., 10 per cent. as a minimum; both figures are too high for the jalap of our commerce. The highest I have found is 8.5 per cent.[1]

NEWARK, N. J., May, 1889.

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[1] Two of the eight samples of jalap assayed by Mr. W. L. Turner yielded 10.36 and 19 per cent. of resin.—AM. JOUR. PHAR., 1888, p. 379; see also *Ibid.* 1887, 321–327).—EDITOR.

INFUSION OF DIGITALIS.

By Joseph W. England, Ph. G.

From a paper read before the Pennsylvania Pharmaceutical Association, June 5.

In the introductory portion of his paper, the author refers in detail to the chemical researches on digitalis, and lays stress upon the fact that the active constituents may be divided into three groups. First, those soluble in alcohol and insoluble or nearly insoluble in water; second, those soluble in water and insoluble or nearly insoluble in alcohol; third, those soluble in both alcohol and water. Under the first group are placed digitalin and digitoxin; under the second digitonin; under the third, digitalëin. The tincture and fluid extract being alcoholic or rather dilute alcoholic preparations, contain most largely, digitalin, digitoxin and digitalëin, whilst the infusion, an aqueous preparation, holds in solution digitonin and digitalëin. It is evident from these facts, comments the author, that the custom of making infusion of digitalis from the tincture or the fluid extract, needs to be mentioned only to be condemned, and should never be followed.

To determine the value of an infusion of digitalis the first step would be to ascertain the percentage of active ingredients and next to standardize. In the absence of standardization the best method would be to ascertain the amount of solids, active and inactive, dissolved. In view of its delicate chemical composition, it is manifest that prolonged heat should not be used to obtain such results, so in all the experiments herein recorded, evaporation of the finished product was not resorted to. The amount of solids dissolved in each fluidounce was found by taking the specific gravity of the infusion (in a flask holding 32·4 gm. of distilled water, at 70° F.), multiplying it by the weight of a fluidounce of water and subtracting from the result 455·69 grains.

The first series of experiments made were to determine whether cold or boiling water exerted the greater solvent action upon digitalis and whether, in each instance, maceration for one, two, three or four hours produced any variation. The results of eight experiments upon the same sample of powdered digitalis (No. 80), one drachm to each pint of infusion, were these, that the cold water infusions were lighter in color than those made with boiling water, and that the specific gravity (1·00154) was identical in *all* cases, whether maceration was for one, two, three or four hours. It may then be deduced that cold water infusions are preferable to those made with boiling water, because, al-

though having the same specific gravity as the latter, they contain a relatively larger percentage of active solids, because the latter hold more coloring matter in solution, and as both exhibit the same amount of dissolved solids it must then contain a smaller quantity of the colorless, active ingredients. This belief is confirmed in the observations of M. Roger[1], who found that "the toxicity of digitalis diminishes very notably, when the product of maceration is concentrated by the water-bath. Then, a 5 per cent. maceration, which is toxic in doses of 0·05 gm., no longer kills save in doses of 1·8 gm., when it is concentrated by 4 per cent. If reduced by 6·6 per cent., 3 gm. would be required to produce the same effect." These experiments would then indicate that the use of heat and boiling water, in the preparation of the infusion, should be avoided, for the reasons that the constituents of the leaf are altered in chemical composition; the active ingredients being changed to non-toxic, inactive ones, whilst the non-active coloring matter is rendered more soluble.

In the previous experiments, the specific gravity of the finished product (made from one drachm of No. 80 digitalis powder to the pint) was 1·00154; showing 0·7 grains of dissolved solids in each fluidounce of the infusion. Eight more samples were now made, double this strength, with cold water and with boiling water, each, and macerated for one, two, three and four hours; using the same digitalis as previously. The results were all alike (sp. gr. 1·00308), indicating 1·4 gm. of dissolved solids in each fluidounce.

It became of interest in this connection, to see just how far this regularity of increase of dissolved solids would go, and fourteen infusions of the same sample of powdered (No. 80) digitalis as previously used, were made of different strengths. The results are these:

Grains to pint, 60, 120, 130, 140, 160, 180, 200, 240, 300, 360, 420, 480, 720, 960.
Solids in fl. oz., ·7, 1·4, 1·54, 1·68, 1·89, 2·1, 2·38, 2·52, 2·95, 3·51, 4·07, 4·50, 6.35, 8·15.

The regularity of increase seems to be reached with 200 grains to the pint; above that point the increase is variable.

Infusions of the *whole* leaf were now made, taking ten different samples (120 grains to the pint, cold water, two hours' maceration, etc.). With singular unanimity they *all* showed the same specific gravity 1·00308, indicating 1·4 gm. of solids to the fluidounce, a remarkable constancy in the amount of solids dissolved.

[1] Toxic Power of Digitalis; *Nouv. Rem.*, Feb. 24, 1889; *vide* AMER. JOUR. PHAR. 1889, p. 174.

To compare this result with those of infusions made from the No. 80 powder (same strength, conditions, etc.) ten different specimens were made from commercial samples. The results are variable, as follows:

Solids in fl. oz., 1·4, 1·26, 1·12, 0·98, 1·4, 1·4, 1·4, 1·12, 1·12, 1·26 grains.

It should be mentioned that in all these experiments the so-called English leaves were used. Right here, it is of value to know whether the popular prejudice in favor of the English leaf is founded on any other basis than that of custom. So ten infusions of German digitalis leaves, as found in commerce (120 grains to the pint, cold water, two hours' maceration, etc.) were prepared. The results were as follows:

Solids in fl. oz., 1·4, 1·12, 1·105, 1·4, 1·105, 1·12, 1·4, 1·26, 1·4, 1·4 grains.

It will be observed that the amount of solids dissolved is not constant, as in the commercial English leaf. Examination of the commercial German leaves reveals the fact that they have not been as carefully selected and freed from stalks, etc., as the English leaves. That the difference in the care of collection and selection is the only difference is shown by the fact, that the infusion when made of leaves selected from each of the ten specimens above evinced 1·4 grains of dissolved solids in each fluidounce, as in the English-leaf infusions, and that the infusion when made of stalks, etc., selected from each of the ten specimens above gave but 0·98 grs. of dissolved solids in each fluidounce, indicating that it was the large and varying quantity of stalks in the commercial German leaves which caused the variability in the amount of solids dissolved, and that the English leaves were superior to the German only because the commercial samples of the former were carefully selected and freed from the stalks; thereby reducing the element of variability to a minimum. In point of fact, it has been intimated that some of the English dealers buy their digitalis leaves in the German markets, and select and repack them as English leaves. Whether this is the case or not the writer does not know.

That the small quantity of solids dissolved in the infusion made of stalks shows a low percentage of active ingredients, is indicated by the experiments of Mr. Broeker,[1] who, while he found about 1 per cent. of digitalin in the parenchyma of the leaf (the stalks and nerves

[1] *Amer. Drugg.*, Jan., 1888, p. 10; from *Niew Tijdschr. voor de Pharm. in Netherland.*

being rejected), found in the stalks and nerves only 0·2 per cent. of that constituent. Moreover, he observed that the presence of these latter is liable to render the infusion gelatinous.

Although digitalin is insoluble in water, and hence the results of Mr. Broeker cannot be used to prove that the stalks are largely destitute of the water-soluble active principles of digitalis, they would indicate that if there was such a radical diminution in the percentage of one active principle, there was in all.

In the officinal infusion of digitalis, it will be remembered that powdered cinnamon (No. 20) is directed to be infused in connection with powdered digitalis (No. 20). Cinnamon is here employed, not for any medicinal action it may possess, but solely for the purpose of flavoring; a purpose which it but imperfectly fulfills, through the solution of a small quantity of volatile oil of cinnamon.

It is of interest to know whether the presence of this volatile oil exerts any retarding influence upon the solution of the water-soluble principles of digitalis. To determine this point, infusions were made of digitalis leaves, which had shown 1·4 grains of soluble solids in each fluidounce of infusion, and cinnamon water, the specific gravity of which was first taken. The result in all cases indicated but 0·98 grains of solids to the fluidounce, a decrease of 0·42 grains, or 30 per cent. It may be claimed that the officinal infusion of digitalis is by no means analogous to cinnamon water in the amount of volatile oil which it contains. But it seems evident that the presence of that volatile oil, however small it may be in amount, must exert a retarding influence upon the solution of the digitalis principles, and hence powdered cinnamon should be dropped from the officinal formula.

In reducing the strength of infusion of digitalis to 7 grains to each fluidounce, the Revision Committee, in the opinion of many, altered the quantity in the wrong direction. It should have been increased, if anything. But as the limit of regular saturation appears to be about 200 grains to the pint, it would be better to return to the pharmacopœial strength of 1870, *i. e.*, about 7·5 grains to the fluidounce, or 120 grains to the pint.

The following is the formula in use by the writer:

Take of digitalis leaves, bruised	120	grains,
water	14½	fluidounces,
alcohol	1½	" "

Macerate the digitalis leaves, previously bruised in a wedgwood

mortar, for one hour, with the water; agitating occasionally. Express, filter and wash the residue placed on the filter with sufficient water to make the filtrate measure 14½ fluid ounces. To this add the alcohol. As made by this formula the infusion is a clear transparent, amber-colored liquid, darkening in color on keeping for several days; characteristic in odor and bitter in taste. It is well, in view of the ready decomposition of such a weakly alcoholic solution, to make only such quantities as will last but a short time, or better still, to make it extemporaneously. This latter method is readily practicable with such a short period of maceration. In the preparation of infusion of digitalis there is urged the usage of the English leaf, or the German leaf selected and freed from stalks; the employment of the whole leaf, broken up as above directed, instead of a No. 20 powder; cold water maceration instead of boiling water infusion, for reasons previously mentioned; the omission of powdered cinnamon, as retarding the solution of the digitalis principles and as of no special value as a flavor; and, lastly, one hour's maceration as all sufficient for the solution of the water-soluble digitalis principles.

USEFUL PLANTS OF THE GENUS PSORALEA.

By John M. Maisch.

Read before the Pennsylvania Pharmaceutical Association, June 5.

One of the most interesting groups of plants are those belonging to the order of leguminosæ which—as remarked by Lindley—"is not only among the most extensive that are known, but also one of the most important to man, whether we consider the beauty of the numerous species, which are among the gayest-colored and most graceful plants of every region; or their applicability to a thousand useful purposes." Many of the plants are medicinal or yield medicinal products, quite a number of which have been admitted into the various pharmacopœias, including some which are decidedly toxic, like physostigma.

Among the leguminous plants indigenous to the United States a species of Psoralea, common in our Southern States and west of the Alleghenies, has attracted some attention as a medicine, and though it does not seem to possess properties superior to other more generally known drugs, it will perhaps be of interest to collect together the most important facts, recently ascertained or heretofore known, regarding the medicinal or economic value of the different species of this genus.

The name of the genus is derived from the Greek *psoraleos*, which

means "affected with the itch or with leprosy," and has reference to the usually blackish glandular points found on the calyx and often on other herbaceous portions of most of the species. The plants are botanically closely related to the genus *Amorpha*, of which the indigenous *A. fruticosa* has a bark rich in tannin and containing a brown-red coloring matter, dyeing yellow with alum. The genera Glycyrrhiza, Astragalus, Indigofera, Robinia, Wistaria and others belong to the same tribe. The genus Psoralea comprises herbs, also shrubs, having leaves mostly divided into three or five leaflets, and a spiked or racemed inflorescence, the flowers being mostly purplish or blueish; the fruit is a one-seeded, indehiscent, frequently rough or wrinkled legume, which is about the length of the persistent calyx. About one hundred species of Psoralea have been described, of which more than forty, or nearly one-half, belong to Southern Africa, five or six to South America, and about thirty to North America; the greater portion of the latter are confined to the Southern States and west of the Alleghanies, and eight are found in California.

Only a small number of the species have been used, some medicinally, others as food. The food plants as far as known, have their homes in the western section of North America. Two were mentioned some years ago by Dr. Edward Palmer in a paper entitled "Plants Used by the Indians" (see AMERICAN JOURNAL OF PHARMACY, 1878, p. 545), namely:

Ps. castorea, Watson, growing from Arizona to Nevada; the large white farinaceous roots are eaten by the Pah-Utes, raw as well as cooked, or made into bread or mush. The same tribe uses also the roots of

Ps. mephitica, Watson, which are small but farinaceous. The plant is abundant in low places in Southern Utah; its specific name refers to the unpleasant odor of the leaves.

Ps. esculenta, Pursh, has been more widely known than the preceding two species. In the beginning of the present century it was brought to Europe by Lamare-Picquot who recommended it as a substitute for the potato. It was cultivated for some time in France where it became known as *picquotiane;* but the results were not encouraging, and at present it is rarely met with in Europe.

I am indebted to Mr. Clifford Richardson of Washington, D. C., for the following graphic description of the plant, its tuberous root and the uses of the latter, written by Dr. V. Havard, Surgeon U. S. Army at Fort A. Lincoln, Dakota.

"The plant is the *pomme de prairie* or *pomme blanche* of the early Canadian voyageurs; the *prairie turnip* or *prairie potato* of the American settlers; the *tipsinah* of the Sioux, and the *taahgu* of the Osage Indians.

"Description: Perennial; roughish hairy all over; stem stout, erect, somewhat branched, from 5 to 15 inches high, growing from a tuberous root; leaves on long petioles, palmately 5-foliolate, the obtuse leaflets obovate, oblanceolate or oblong, about 1¼ inches long; stipules free, lanceolate; flowers appearing in June and July in dense thick spikes about 2 inches long, borne on peduncles 2 to 3 inches long, exceeding the petioles; each three-flowered cluster subtended by a large bract; lobes of calyx lanceolate, acuminate, 4 to 6 lines long, equal to, or larger than, the gibbous tube, and but little shorter than the purplish corolla; seed oval, 3 lines long, flat, smooth and shining.

"Soon after blossoming the plant dries up into a brown rigid mass, then breaks off and becomes a "tumble-weed" blown over the prairie, scattering its seeds as it goes.

"The tuber is two or three inches under ground. It is irregularly elliptical in shape, from ovoid to fusiform; in size ranging from a hen's egg to a large filbert, averaging 1½ to 2 inches in length and one inch in diameter. The upper end shows the scars of previous years' stems; the lower end is produced into a long and very tough tap root. It is covered with a thick leathery skin, easily peeled off its white and smooth surface. Passing through the axial line are clusters of fibers, which proceed from the stem and run into the tap root. These tough, fibrous clusters are the only inedible part of the skinned tubers. On section it is seen to be composed of a white granular mass, at first somewhat spongy, but becoming hard on drying, in which state it is friable and easily pulverized into a light starchy flour.

"The prairie turnip is a widely distributed plant. It is found from the lakes westward to the Rocky Mountains, and from the Saskatchawan River downward to Louisiana and Texas. It is on the dry table-lands of the Missouri, however, from Montana, through Dakota and Nebraska, to Kansas, that it is most abundant.

"The tuber of this plant has always been of great importance to the Indians, one of their vegetable staple foods. It is mentioned by all the explorers and voyageurs who first traded with the Indians of the Western prairies. It is in its best condition when the flowers begin to fade, in the latter part of July. At that time the squaws start

out to gather their crop of tipsinah; formerly they used a strong pointed stick to pry the tuber out; now they use a small iron bar, one end of which is beaten into a narrow blade. The tuber, cut into slices and dried, can be kept for several years without deterioration. In this state it is found in the tents of the Sioux Indians, and formerly constituted an important ingredient of their winter food. Eaten raw it has a very palatable farinaceous flavor. The Indian children, when cutting teeth, are given pieces of it to chew, with apparent benefit; they are treated in the same manner, and likewise with good result, when suffering from bowel complaints. I am told by an old settler that on several occasions, when making long marches without water, he successfully appeased the sharp pangs of thirst by keeping pieces of it in his mouth, their effect, doubtless, being to stimulate the salivary glands. The Indians generally eat this root cooked, and as they appreciate the advantages of a mixed *pot-au-feu*, boil it with tripe, fattened pup, or other choice nitrogenous food.

"Although the prairie turnip is mostly found on high prairies, it does not follow that it prefers a sandy, barren soil; on the contrary, I have observed that it thrives best in deep and fertile soil, if, at the same time, dry and porous; under such conditions the root attains its maximum development. I have hardly any doubt that under patient cultivation for a few seasons it could be improved, perhaps to an extent that would make such cultivation profitable, and supply our market with another toothsome, wholesome and nutritious vegetable."

Dr. Havard had sent some of the root to Mr. Clifford Richardson for analysis, which was completed last year, but has never been published, and was kindly furnished by him for publication with this paper. Mr. Richardson's results are as follows:

Water	9·49
Ash	1·74
Oil (with petroleum ether)	·37
Resinous substances (with ether)	·35
Sugar (with 80 per cent. alcohol)	4·77
Sweet substance (soluble in water)	1·14
Starch (by difference)	69·60
Globulin	1·04
Albumin soluble in water	1 02
Albumin insoluble in water	6·10
Non-albuminoid nitrogenous matter	·90
Fibre	3·48
	100·00

Mr. Richardson remarks that the roots are distinguished by their large amount of starch, the presence of a new sugar readily crystallizing, and by the varied forms of nitrogenous matter; he will further investigate the sugar isolated by him.

An analysis of the root, communicated by Payen to *Comptes rendus* in 1848, gave water 12·50, mineral matter 1·61, nitrogenous matter 4·09, and starch 81·80. The last-named item evidently includes other carbohydrates and compounds separated by Mr. Richardson.

The three American species named above are the only ones used as food, as far as I was able to ascertain. Of the species medicinally employed,

Psoralea glandulosa, Linné, attained some notoriety and created some confusion during the first half of the present century through an error into which the distinguished French naturalist, Alcide Dessalines d' Orbigny was led, more than sixty years ago, while traveling in South America, by referring to this plant the Paraguay tea, or *yerva maté*, which is extensively employed in South America. The parent plant of this tea had been previously named *Cassine Gongonha* by the German scientist, Karl Friedrich von Martius, and *Ilex paraguariensis* by the French botanist, Auguste de Saint-Hilaire. The name given by the last-named authority is generally recognized; but d' Orbigny's error figured in scientific literature to some extent for about thirty years, and as late as 1850, Lenoble, when publishing an analysis of Paraguay tea, followed the erroneous nomenclature [see AMER. JOUR. PHAR., xxiii., 182]. To the same mistake must also be attributed the origin of the statement current in some recent works, that the leaves of this species are used in Chili as a *substitute* for Paraguay tea. The leaves were exhibited at the Centennial Exposition in Philadelphia [see *Proc. Am. Phar. Assoc.*, 1876, p. 765), under the vernacular name of *culen*. The odor can hardly be called agreeable; it resembles that of rue, and the leaves are in their native country employed as a tonic and anthelmintic, and externally as a vulnerary. The root possesses emetic properties. Both the leaves and root have been admitted into the Mexican pharmacopœia under the name of *yolochiahitl* [AM. JOUR. PHAR., 1886, p. 171]. An analysis of either part does not appear to have been made.

Psoralea bituminosa, Linné, is a suffruticose plant of Southern Europe, the leaves being trifoliolate, like those of the preceding species;

the specific name refers to the peculiar odor of the plant. The leaves have long been popularly employed as a tonic, stimulant and emmenagogue.

Ps. physodes, Douglas, likewise a species with three leaflets, is enumerated by Dr. W. P. Gibbons in a "list of the Medicinal Plants of California" (see *Proceedings of Am. Phar. Assoc.*, 1871, p. 300), but its reputed properties or uses are not given. Neither is the plant mentioned by Carter.[1]

Ps. melilotoides, Michaux, s. Ps. Melilotus, *Persoon,* grows from Virginia southward, and westward to Illinois. It is very common in middle and upper Carolina and in Georgia. Two students of the Philadelphia College of Pharmacy, Aug. Bradley and Edward D. MacNair, both from North Carolina, call attention to this plant in their graduating essays, which are mainly of a descriptive nature. As indicated by the specific names the plant resembles the melilot or sweet clover in appearance. It is somewhat pubescent and more or less glandular; the stem grows to the height of two feet, is much branched, and bears trifoliolate leaves, the leaflets varying in shape between lanceolate and narrowly oblong; not unfrequently they are glandless, which is the main distinctive character of the form Psoralea eglandulosa, *Elliott.* The numerous small purplish flowers are in axillary and terminal long-peduncled oblong spikes, and produce oval or suborbicular, transversely wrinkled pods. The perennial root is fusiform, sending out stout branches of similar shape, ½ to 1 inch thick, from 8 to 12 inches and more in length, externally light-brown, internally white, and tough and fibrous in the bark as well as in the meditullium. The plant is collected when in full bloom. The herbaceous portion being of a weaker odor and taste is used to some extent; but the root is the principal part employed. In the fresh state it has an agreeable aromatic odor, and a bitterish spicy, or even rather acrid taste; but odor and taste are much weaker after drying.

Mr. MacNair obtained from the fresh root about 2 per cent. of volatile oil, having the sp. gr. 0·93, a pungent and bitterish taste and a neutral reaction. Tannin appears to be absent; but a dark-green color is produced in the infusion and tincture by ferric chloride. Starch is present; also a bitter principle which has not been isolated.

Dr. Carter (*loc. cit.*) states that the drug is aromatic, bitter tonic,

[1] Synopsis of the Medicinal Botany of the United States. By J. M. G. Carter, M. D., 1888.

nervine, and is used in chronic strumous diarrhœa. The same properties were attributed to it by Dr. Mettauer, in 1867. It is said to have been much and very advantageously employed by the negroes in an affection of the digestive organs, known to them by the name of *poison*, and is usually given in the form of infusion made with the addition of a little chamomile and Canadian hemp (apocynum). Mr. MacNair has made a number of galenical preparations, among them

Tinctura Psoraleæ composita, following the pharmacopœial formula for compound tincture of gentian, substituting psoralea root for the gentian.

Extractum Psoraleæ was prepared with diluted alcohol and *Extr. Psoraleæ fluidum* with diluted alcohol, the finished preparation containing 5 per cent. of glycerin.

Mr. Bradley states that the drug is administered in the form of a 20 per cent. *tincture*, made with diluted alcohol, and given in doses of one to four drachms.

Some of the popular names of the drug are Samson's snake root, congo root, pigtail root, and Bob's root.

Psoralea pentaphylla, Linné, is a Mexican species having five leaflets. During the past century the root was sent to Spain; it is mentioned in the universal pharmacopœias of Jourdan (1828), and Geiger (1835), as *radix contrayervæ novæ, p. albæ* (*s. majoris, s. mexicanæ*); it had been recommended as a substitute for the South American contrayerva (*Dorstenia*), but like the latter had become obsolete. Though of Mexican origin, it appears to be at present little known in that country, and is not mentioned in the Mexican Pharmacopœias of 1874 and 1884. The root was described as being of the thickness of a finger to about two inches, with a rugose brown bark, which is internally white and covers a white woody axis; taste aromatic and sweet.

Recently the drug was chemically examined by Mariano Lozano y Castro,[1] who obtained the following results: Moisture, 10·0; ash, 3·75; extracted by petroleum ether (fat, 1·38; resin and volatile oil, 0·12), 1·50; ether extract (crystalline acid, 0·40, fat, 0·50, resin and color, 2·40), 3·30; alcohol extract (alkaloid and glucose, 9·25; resin, 1·46), 10·71; water extract, gum and sugar, 8·336; starch, 26·5; albuminoids, 1·0; cellulose and lignin, 28·75 per cent. The presence

[1] La contrayerba blanca o de México. Mexico, 1889. Pp. 48.

of an alkaloid was inferred from the precipitates obtained in the aqueous solution of the alcohol extract by tannin, picric acid and platinic chloride. Subsequently Mr. Lozano prepared 8 per cent. (40 gm. from 500 gm. of the root) of what he considered nearly pure hydrochlorate of the alkaloid which gave alkaloidal reactions with other reagents (Mayer's and Marmé's), besides those mentioned before. It was obtained by mixing the powdered root with lime and water, after three days treating with water acidulated with HCl, concentrating the filtrate, mixing with alcohol, filtering, evaporating, treating the extract with alcohol, evaporating, taking up with water, repeating these operations several times, and finally decolorizing with animal charcoal. While it is possible, though by no means certain yet, that the root may contain an alkaloid, it has not yet been isolated, and the chemical reactions and physiological experiments described by Lozano were made with calcium chloride mixed with organic matter of unknown quantity and quality.

Psoralea corylifolia, Roxburgh, is an annual plant with undivided leaves, the seeds of which have been long in use in India as a tonic and deobstruent and in skin diseases. In 1876 (*Proc. Am. Ph. A.*, 1877, 209), Dymock called attention to the use made in India with the oil expressed from the seeds, and later (*Ibid.* 1882, p. 245), the oleoresin of the seeds diluted with simple unguents was highly lauded for its efficiency in leucoderma. Sometimes it was used mixed with chalmugra oil, to which some of the alleged effects in skin diseases may have been due. But the writer has been unable to find any record of the results of experiments, which were said to have been undertaken in England with the oil and the oleoresin of these seeds, during the years 1881 and 1882.

Whether others of the North American species of Psoralea, besides those mentioned above, possess valuable medicinal properties must be left for future investigations to decide. The genus is certainly an interesting one, notwithstanding the economic and medical uses are confined to a small number of species and to limited localities.

Chloral in night sweats.—Dr. Nicolai has used an embrocation of chloral hydrate, two drachms, dissolved in a tumblerful of brandy and water. At night about bedtime the patient is rubbed all over with a sponge dipped in this solution. Sometimes three or four rubbings suffice to effect the complete disappearance of night sweats which have previously lasted for weeks. —*Boston Med. and Surg. Jour.*

GLEANINGS FROM THE GERMAN JOURNALS.

By Frank X. Moerk, Ph. G.

Salicylic acid can be examined for homologous acids (cresotic acid, etc.) by taking advantage of the low melting point of such a mixture. Three gm. of the acid are heated in a small flask with 15 cc. water and 1–2 gm. pure calcium carbonate (free from iron); after effervescence ceases the solution, without filtration, is evaporated to 5 cc., allowed to cool, diluted with a little water and the solution poured off from the precipitate into a wide test-tube, in which evaporation is continued until 1 cc. remains; by stirring with a glass rod crystallization is hastened; after diluting with 1 cc. water the solution is passed through absorbent cotton, and after concentrating again to 1 cc. in a test-tube the acids are precipitated by addition of HCl. If the original salicylic acid contained 3–5 per cent. of other acids the precipitate obtained above will *melt* under hot water and form a *thick oily liquid* at the bottom of the test-tube.—B. Fischer, *Pharm. Ztg.*, 1889, 329.

Estimation of sodium carbonate in presence of sodium hydrate.—The process depends upon the combined use of phenolphthalein and Blue C. L. B. Poirrier as indicators. The estimation is effected by titrating in the cold 10 cc. of a solution containing 8–10 gm. of the substance dissolved in one liter, after one drop of phenolphthalein has been added with a standardized dilute hydrochloric acid (about 3 cc. acid, sp. gr. 1·16 in one liter water) until a colorless solution results; then adding one drop of Blue, Poirrier, (1 part in 400 parts water) and continuing the titration until the solution becomes dark blue (color of ammoniated copper solution). The acid added after the blue indicator, represents one-half of the carbonate which is present; the total acid added minus that required by the carbonate will give the acid required by the hydrate present. It is stated that the volume of the finished titration should not exceed 50 cc.—Dr. H. Goebel, *Chemiker Ztg.*, 1889, 696.

Mercuric benzoate is made by E. Lieventhal by dissolving 125 parts mercuric oxide in 250 parts nitric acid, sp. gr. 1·20, diluting with 4000 parts distilled water and filtering; 188 parts sodium benzoate are dissolved in 4000 parts distilled water, the solution filtered and slowly added, with constant stirring, to the first solution; the bulky precipitate is collected on a linen strainer, thoroughly washed with cold water, expressed and dried. The product forms a light, white powder, slightly soluble in ether, alcohol, chloroform and water, but

easily dissolves in water if half its weight of sodium chloride is added. This solution gives all of the reactions of mercuric salts, excepting the precipitation by albumen; to this behavior its use in subcutaneous injections is possibly due. Alcohol and ether poured over the powder cause it to assume a yellow color.—*Pharm. Ztschr. f. Russl.*, 1889, 310.

Potassium chlorate, identification of in legal cases. 1. A few crystals in a test tube treated with one to two drops concentrated HCl produce a yellowish-green coloration and the suffocating odor of chlorine; on adding a few drops of the turbid, brownish mixture obtained by mixing a dilute gold solution with a dilute oxalic acid solution and warming, chlorate is indicated by the finely divided gold immediately dissolving with formation of a yellowish solution; nitrates will not dissolve the precipitated gold. 2. One drop concentrated H_2SO_4, to which a minute fragment of the salt has been added, on stirring with a glass rod assumes an orange-red color, which, on addition of one drop benzole becomes green, afterwards sky-blue; with nitrates only a faint yellowish coloration is produced. 3. Sulphuric acid and the salt, as before, with a trace of aniline or one of its salts, forming a beautiful blue-violet coloration, intensified by addition of a little water, also proves the presence of chlorate.—*Vitalli* (*L'Orosi*) *Pharm. Centralh.*, 1889, 328.

Hydracetin is the name proposed by Guttmann for *pure acetphenylhydrazid*, $C_6H_5NHNH(C_2H_3O)$, which a year ago was used in England in an impure condition under the name of pyrodine. It forms a white, crystalline, odorless and almost tasteless powder, difficultly soluble in water (1 : 50), easily soluble in alcohol and possesses even in small doses decided antipyretic action. The dose should not exceed 0·1 per day, best given in two doses of 0·05 gm. each. Hydracetin is a powerful reducing agent, especially on warming and in presence of alkalies; cupric solutions deposit cuprous oxide; silver and platinum solutions deposit metallic silver and platinum; mercuric solutions and ferric salts are reduced to mercurous and ferrous salts; potassium permanganate is decolorized. A fine carmine-red color is obtained by dissolving hydracetin in a mixture of concentrated H_2SO_4, ninety-eight parts, and HNO_3, two parts. The medicinal effects of this remedy are thought to be caused by its strong reducing action; it has also been successfully used as ten per cent. ointment in the treatment of Psoriasis.—*Pharm. Centralhalle*, 1889, 311 and 341.

Starch determinations.—Asboth's method of precipitating gelatinized starch by barium hydrate in presence of alcohol has been repeatedly criticized as to its value in the examinations of cereals, inasmuch as Lintner's method of converting the starch into glucose by action of diastase and dilute acid always gave results which were 6–8 per cent. lower. Asboth, *Chemiker Ztg.*, 1889, 591 and 611, has studied the causes of the differences and finds them due to the presence of fats or oils which, by containing free acids or easily decomposable glycerides, combine with the barium hydrate and thus increase the results for starch. This source of error is now removed by extracting the substance first with ether to remove fats, exposing the extracted substance to the air to remove the ether and determining in one portion the moisture, in another portion the starch as follows: About 1·5 gm. are gelatinized in a flask with 100 cc. water, after cooling to the ordinary temperature, 50 cc. barium hydrate solution added, thoroughly mixed by agitation, and then diluted with alcohol of 45 per cent. to make 250 cc. After the precipitate has completely subsided 50 cc. of the clear liquid representing 10 cc. $Ba(OH)_2$ are removed with a pipette and in this the $Ba(OH)_2$ determined by titration with $\frac{1}{10}$ *n* hydrochloric acid, using phenolphthalein as the indicator. 10 cc. of $Ba(OH)_2$ solution must also be titrated and, the difference, in cc. $\frac{1}{10}$ *n* HCl, between the two titrations multiplied by 0.162 will give the amount of starch in the weight taken; this figure must be re-calculated for the original fat-containing cereal.

An insecticide of especial value against the Phylloxera is made by saponifying any vegetable oil with sulphuric acid, incorporating carbon disulphide and exactly neutralizing with an alkali; this preparation is as efficacious as pure carbon disulphide, but is not volatile and is miscible with water. In contact with water or moist soil, slow decomposition takes place with evolution of SO_2 and mercaptans, which latter increase the effectiveness.—Kühl, *Apotheker Ztg.*,1889, 506.

Mandragorine is the name of the alkaloid which was found in the roots of Mandrogora autumnalis and M. vernalis by extracting with alcohol, recovering the alcohol by distillation, taking up the residue with water acidulated with sulphuric acid, rendering the solution alkaline with potassium carbonate, agitating with ether and evaporating this solution. The alkaloid melts at 77–79°, and has the formula $C_{17}H_{23}NO_3$; the sulphate forms lustrous, deliquescent scales, the solution of which introduced into the eye dilates the pupil. Although

isomeric with atropine, hyoscyamine and hyoscine, the double chlorides with the following metals possess different melting points: with Au, 153–155°; with Pt, 194–196°; with Hg, 160–161°; the crystalline forms of these double salts are not identical with those of the three alkaloids mentioned. The conversion of mandragorine into atropine by the action of sodium hydrate could not be effected. A second alkaloid in very minute quantity was extracted by treating the residue of the above alcohol extraction with water acidulated with HCl, concentrating, adding K_2CO_3 in excess and agitating with ether; the residue after evaporating the ether was also mydriatic and formed double chlorides with Au, melting point, 147–153°; with Pt, melting point, 179–181°.—F. B. Ahrens (Liebig's Ann.), *Pharm. Ztg.*, 1889, 308.

Lithium salts.—Sulphate of lithium is generally quoted as being soluble in alcohol. F. Kobbe found that one part sulphate, $Li_2SO_4 + H_2O$, is soluble in 8000 parts of alcohol specific gravity 0·812, in 125 parts of alcohol specific gravity 0·885, and in 79 parts of specific gravity 0·902; the presence of sulphuric acid increases the solubility, one part sulphate with an equal weight of concentrated sulphuric acid dissolving in 43 parts of alcohol specific gravity 0·885. *Acid lithium sulphate* cannot be prepared; a mixture of normal sulphate with H_2SO_4, after moderate heating, had a composition approaching that for $LiHSO_4$, but the addition of alcohol decomposed it into Li_2SO_4 and H_2SO_4. The solubility of the sulphate can be used as a test of purity for *carbonate of lithium:* 0·5 gm. carbonate of lithium dissolved in 10 gm. dilute sulphuric acid must remain clear on addition of 20 cc. alcohol. From 3 to 4 per cent. potassium carbonate and as little as 0·5 per cent. calcium carbonate can be detected by this test; sodium carbonate in quantities to 10 per cent. cannot be detected, but here recourse is had to the flame test, 5 per cent. Na_2CO_3 entirely obscuring the lithium flame. This test is more delicate than the one based on the solubility of the chloride in alcohol.—*Pharm. Ztg.*, 1889, 312.

Commercial Oleic Acid is largely adulterated with *linoleic acid*; the presence of one per cent. can be detected by saponifying 50 gm. of the sample with alcoholic potassium hydrate solution, evaporating the alcohol, dissolving the soap in one liter water and thoroughly mixing the soap solution, which must be strongly alkaline, with one liter of a 5 per cent. potassium permanganate solution; after standing ½-1

hour the mixture is filtered, the filtrate acidulated with dilute H_2SO_4, and again filtered from the precipitate; this filtrate is neutralized with potassium hydrate, concentrated to about 300 cc., acidulated with sulphuric acid and, at once, agitated with ether; if the precipitate is soluble in ether only azaleinic acid $C_9H_{16}O_4$ is present, formed by the oxidation of oleic acid, and the oleic acid was free from linoleic acid; if the precipitate is insoluble in ether it is removed by filtration, purified by recrystallization from alcohol or water in presence of animal charcoal and the melting point of the dried crystals determined, should this be above 160° linoleic acid was certainly present. As a control experiment the combining value of the crystals can be determined, which should approach 150.—K. Hazura, *Chem. Report*, 1889, 168.

Chemical examination of resins, gum-resins and balsams.—The suggestion made by Kremel to examine the above classes of substances by Hübl's method of examining waxes (see AM. JOUR. PHARM., 1888, 561), was carried out by Dieterich with results which indicate the value of the method in examining the balsams. The figures given represent the extremes:

Resins and Gum-resins.	Acidity-	Ester-	Saponification figures.
Ammoniac, purified.....	132	73	205
Colophony.....	157-169·6	——	——
Benzoin, Siam.....	140	35	175
" Sumatra.....	112	51·4	163·4
Balsams.			
Canada.....	84 86·8	——	——
Copaiba, Para.....	52·3 53·2	——	——
" Maracaibo.....	73·7-86·8	——	——
" East India.....	6·5-7·4	10·3-11·2	16·8-18·6
Mecca, crude.....	42·7-43·8	——	——
" purified.....	40.1	——	——
Peru.....	50·4-58·8	196-201·6	246·4-254·8
Tolu, crude.....	121-126	49 60·6	173·1-181·6
" purified.....	154 158	14-32·6	172·6-186·6
Styrax, crude.....	64·4-87	87-162·4	157-249·4
Terebinth. commun.....	108·2	——	——
" venet.....	78·4	——	——

Attention is called to the differences in *acidity* of the varieties of copaiba, also that only the East Indian contains esters; so it is possible to distinguish the varieties and even approximate admixtures. The results of the balsam examinations with the exception of styrax are fairly uniform and encouraging to further work.—(Helf. Ann.) *Pharm. Post*, 1889, 336.

ERYTHROXYLON COCA GROWN IN INDIA.[1]

By C. J. H. Warden.

Several samples of *Erythroxylon Coca* leaves, grown in various districts in India, have been examined by the author; the mode of culture, altitude, and meteorological characters of the district, the kind of soil and manuring, and the methods of curing, being taken into consideration. The alkaloid was estimated by Squibb's modified method:—the dry pulverized leaves were moistened with alcohol acidified with sulphuric acid, percolated with alcohol, the percolate mixed with acidified water, and extracted with ether, then rendered alkaline with sodium carbonate, and again extracted with ether. This extract was washed twice with water, dried and weighed; the amounts of "crude alkaloïd" so determined are given in the following table:—

District where grown.	Moisture.	Per cent. dry leaves.	
		Ash.	Crude alkaloïd.
Ranchi, young leaves	6·18	6·71	1·139
" mature leaves	8·22	8·99	0·883
Arcuttipore, Cachar	6 08	7·39	1·369
" "	6 72	6 36	1·671
Darjeeling	10·37	7·58	1·115
Alipore, Calcutta	10·42	10·23	0 358
Matelli	9·30	12·18	1·022
Chulsa, Dooars	5·71	7·62	0·610
Jaunpore	10·05	12·64	0·571

The crude alkaloïd was very faintly yellow, and in no case showed any tendency to crystallization, although attempts were made to induce crystallization by extracting at various temperatures, and without applying heat, and by employing different acids and solvents. The alkaloïd obtained is, nevertheless, quite similar to cocaïne from other sources in its physiological action, except that it seems to be more active. It dissolves readily in hydrochloric acid, and yields a soluble and insoluble platinochloride, the former containing 18·75, the latter 18·88 per cent. of platinum; discrepancies from the theoretical are assumed to be due to a variable quantity of cocamine (Hesse, Am. Jour. Phar., 1887, p. 455) in the alkaloïd from Indian leaves. Both

[1] *Chem. News*, lviii., 249–251, 260–262, 273–276; reprinted from *Jour. Chem. Soc.*, March, 1889.

platinum salts yielded bases producing marked anæsthetic effects on the tongue; Howard has observed that the insoluble platinochloride obtained from other leaves was devoid of this property (Phar. Jour. and Trans., July 23, 1887). In one instance stellate crystals of the base from the soluble platinum salt were obtained. Applying Williams' method, the crude alkaloïd showed 2·89 per cent. of impurity, but the precipitates were not crystalline. It is noted that after the addition of ether to the acidified alcoholic solution, larger deposits of the sulphur-yellow cocatannic acid were obtained from those samples containing the highest percentages of alkaloïds, it is hence suggested that possibly cocaine exists in the leaves as cocatannate.

Methods of cultivating the plants are described: the leaves are first gathered 1½ years after transplanting, subsequently, whenever they are sufficiently mature; and, although the method of curing does not appear to affect the quality or quantity of the alkaloïd obtained, nevertheless it is best, taking into consideration Paul's experience, to dry them, soon after gathering, at as low a temperature as possible, and when dry and cold to pack them closely in air-tight chests, as they are very hygroscopic. The quantity of alkaloïd produced increases with the age of the plants (which attain a height of from 2 to 6 feet) up to 10 years, and after 20 years a slight falling off is observed, although they are in their prime even when 35 or 40 years old.

From the above results, obtained from plants and leaves of various ages, it would seem that, in India, neither altitude nor rainfall have much influence on the proportion of alkaloïd in the leaves. The ash, in all cases except one, was white, the exception being an ash of a reddish hue from mature Ranchi leaves. A partial examination of some of the ash showed that they contained the following percentages:—

Samples from	Soluble constituents.	K cal as KHO.
Darjeeling	44·42	29 26
Alipore, Calcutta	34.60	19·13
Aruttipore, Cachar	59·02	29·84
Matelli	64·17	31·36

So that both nitrogenous and potash manures will probably be required in the future to keep up the yield from the same plantation.

ANDROMEDOTOXIN.[1]

By P. C. Plugge and H. G. de Zaayer.

Plugge first obtained andromedotoxin, which he extracted from *Andromeda japonica, A. polifolia, A. Catesbœi* and *A. calyculata* (see Am. Jour. Phar., 1883, 196).

The aqueous extract of *Rhododendron ponticum* leaves was treated successively with normal and basic lead acetate. From the filtrate, the lead was separated by hydrogen sulphide, and the liquid was concentrated by slow evaporation in the air, and treated repeatedly with considerable quantities of chloroform. The residue left on evaporating the chloroform was purified by re-solution in chloroform (or alcohol) and precipitation by the addition of a considerable amount of ether. This treatment several times repeated finally yielded well-formed, crystalline needles which melted at 228–229°. At 12.5°, water dissolves 2 81 per cent.; alcohol (of 94 per cent.) 11·1; amyl alcohol, 1·14; chloroform, 0·26; ether, 0·07; benzene, 0·004. The solutions in water, alcohol, and amyl alcohol are lævorotatory, whilst that in chloroform is dextrorotatory. Andromedotoxin, $C_{31}H_{51}O_{10}$, is an indifferent non-nitrogenous compound; its solution in different liquids has a neutral reaction, and it is not precipitated by any of the so-called general alkaloïd reagents. Its reaction with dilute and concentrated mineral acids is characteristic, as with them it gives intensely red decomposition-products. Concentrated sulphuric acid gives a dark reddish-brown, which becomes deeper red on warming, and turns light mulberry-red on dilution with water. The addition of alkali removes the color, which reappears on acidifying. Evaporation with dilute (1 : 5) sulphuric acid gives a beautiful rose-red color. The pure material gives off no odor during this evaporation, but if not completely purified, a strong and very characteristic odor of ericinol is evolved. Evaporation with dilute hydrochloric acid gives a residue somewhat more violet-red in tint. Evaporation with phosphoric acid gives a mulberry-red residue, clearly perceptible with very minute quantities, as in the case of the other acids. The fatal dose for small animals has been found to vary from 0·1–0·45 mgrm. per kilo. body-weight. No chemical antidote is known as yet. In investigating poisoning cases, Dragendorff's process is recommended; but no acid should be used for extraction, as the solubility of the poison is

[1] (*Arch. Pharm.* [3], xxvi., 997–998: reprinted from *Jour. Chem. Soc.*, March 1889, p 278).

not thereby increased. After extraction and purification by evaporation, taking up in alcohol, etc., the substance may be agitated with light petroleum, then with chloroform, and to the residue left by the chloroform the characteristic tests given above may be applied.

NOTE BY THE EDITOR.—Professor Plugge has continued his researches on the presence of andromedotoxin in the order of ericaceæ, and has published his results in *Archiv der Pharmacie*, February, 1889, pp. 164–172. The process for isolation was the one given above; to determine the presence of the principle, the physiological behavior and the most characteristic chemical reactions were used.

Andromedotoxin was found to be present in Kalmia latifolia *Lin.*,[1] Rhododendron maximum, *Lin.* and Rh. Chrysanthum, *Lin.* To these must be added the following ericaceæ, which had been previously found to contain the same poisonous principle: Andromeda japonica, *Thunb.*, A. polifolia, *Lin.*, A. Catesbæi, *Walt.*, A. calyculata, *Lin.*, A. polifolia angustifolia, Rhododendron ponticum, *Lin.*, Rh. hybridum and Azalea indica.

The following plants were ascertained to be free from andromedotoxin: Arctostaphylos officinalis, *Wimm.*, Chimaphila umbellata, *Nutt.*, Oxydendron arboreum, *De Cand.*, Erica vulgaris, *Lin.*, Ledum palustre, *Lin.* To these must also be added the following, which were previously ascertained to be free from this principle: Gaultheria procumbens, *Lin.* (by Prof. Power and N. C. Werbke), Rhododendron hirsutum, *Lin.*, Clethra arborea and alnifolia, *Lin.*

From experiments made by Dr. de Zaayer in determining the lethal dose, for frogs and rabbits, of the fluid extract of Kalmia latifolia, and comparing with the effects of pure andromedotoxin, it is estimated that the former contains about 0·05 per cent. of this poisonous principle.

Fromentin, a new alimentary substance, is the embryo of the wheat reduced to flour, and is stated to contain three times more nitrogenous substance than meat, and a strong proportion of sugar. Hence it would appear that it might advantageously replace powdered meat as a concentrated food. It may be employed for making soups, and even for making biscuits, the taste of which would not be disagreeable.—*Lancet*, March 9, 1889.

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[1] In quoting the literature, Prof. Plugge states that "G. W. Kennedy has found (AM. JOUR. PHAR., XLV, p. 115) the alkaloid (sic) arbutin." Prof. Plugge has evidently not seen the original paper which was published in AMERICAN JOURNAL OF PHARMACY, XLVII (1875) page 5, and in which the word alkaloid does *not* occur.—EDITOR AM. JOUR. PHAR.

COMPOSITION OF THE RESIN FROM PINUS SILVESTRIS.[1]

By V. Shkateloff.

Owing to the discrepancies in the results obtained with the resin of *Pinus maritima*, *P. Larix*, and *P. Abies*, and the uncertain composition of pimaric, sylvic, pinic, and abietic acids, the author has investigated the crystalline acid from the Russian resin obtained from *Pinus silvestris*, growing in the Archangel and Wologda Governments. In order to remove the uncrystallizable substances, the resin, ground fine, was extracted with alcohol of 50—60 per cent. (Maly, *J. pr. Chem.*, lxxxvi, 111), and the residue, which was much whiter than before, was now treated with boiling spirit; the filtered alcohol solution, after remaining some time, becomes almost entirely converted into a crystalline mass. The crystals were washed with alcohol of 85 per cent. and again recrystalized. After thrice repeating this process, 30 per cent. of a perfectly white product was obtained; whereas on repeating the same process with a resin that had been exposed to the action of air for one year, only 20 per cent. was obtained. In order to prevent this from becoming yellow and oxidizing in the air, the operations have to be carried on as quickly as possible; finally a compound, melting at 143°, was obtained. The acid, $C_{40}H_{58}O_5$, is insoluble in water, but easily soluble in alcohol, ether, acetic acid, and liquid hydrocarbons. After fusion, it solidifies to an amorphous, transparent mass, and when heated above 360°, a colorless, uncrystallizable distillate passes over. The rotatory power of the alcoholic solution was found, $[a]j = -73.59°$. It decomposes alkaline carbonates with liberation of carbonic anhydride, and the original acid is reprecipitated from the solution on adding a mineral acid. By the action of hydrogen chloride on the alcoholic solution, the acid is converted into an isomeric acid of the same composition—but of different properties, as it melts at 159—160°, and the rotatory power is $[a]j = -92{\cdot}58°$. From the sodium salt of the original acid, other salts of the following composition were obtained: $C_{20}H_{29}AgO_3$; $(C_{20}H_{29}O_3)_2Ba + 2H_2O$; $(C_{20}H_{29}O_3)_2Ca$, and $(C_{20}H_{29}O_3)_2Cu$. The acid $C_{40}H_{58}O_5$ appears to be a partial anhydride of an acid which gives the above salts, and whose formation may be represented as follows:—$C_{40}H_{58}O_5 + H_2O = 2C_{20}H_{30}O_3$. The ethyl

[1] *J. Russ. Chem. Soc.*, 1888, xx, 477—485; reprinted from *Jour. Chem. Soc.*, April, p. 406.

salt, $C_{20}H_{29}O_3Et$, was obtained as a heavy oil by acting on the silver salt with ethyl iodide. On distillation, it decomposes with elimination of water and the formation of another ethyl salt, according to the equation $C_{20}H_{29}O_3Et = C_{20}H_{27}O_2Et + H_2O$. This new compound is a heavy yellow oil which yields a resin with potassium hydroxide. Finally the author shows that the resinification of the acid when exposed to the air consists in an oxidation accompanied by loss of water. The acid described above agrees in properties with Maly's abietic acid, but differs from it in composition.

ESTIMATION OF PROTEÏDS WITH SPECIAL REFERENCE TO MILK.[1]

By J. Sebelien.

Milk contains three proteïds, caseïn, lactalbumin and traces of lactoglobulin. In order to test the method adopted for the quantitative estimation of the total proteïds and of the individual proteïds, a number of preliminary experiments were made with solutions of (1) pure caseïn containing small quantities of calcium chloride and sodium phosphate, (2) lactalbumin, and (3) egg albumin. Ritthausen's copper sulphate method of precipitating total proteïds was first investigated in the following way: the total nitrogen in the proteïd solution, in the precipitate, and in the liquid from which the precipitate had been filtered off, was estimated by Kjeldahl's process. The two first named had practically the same amount of nitrogen in them, whilst the filtrate was free from nitrogen. Lead acetate was similarly tested; some proteïd was left in solution, and the nitrogen in the precipitate plus that in the filtrate gave too high a result. Tannic acid was found to precipitate all proteïds completely; the precipitate must however, not be washed with hot water or with spirit, as it is partially soluble in both those reagents. Albumoses are only incompletely precipitated by tannic acid, and peptone is soluble in excess of the reagent. The properties of phosphomolybdic acid are much the same, except that it causes a more complete precipitation of both albumoses and peptone.

The question whether albumoses and peptone occur in milk was then investigated. Saturation with ammonium sulphate completely

[1] *Zeit. physiol. Chem.*, xiii., 135–180; reprinted from *Jour. Chem. Soc.*, April, p. 450.

precipitates all proteïds but peptone, which, if present, may be identified in the filtrate by the biuret reaction (Kühne), or better still by the precipitate it gives with tannic acid. Peptone is, however, absent in milk, and also in colostrum, and in whey; the whey-proteïd of Hammarsten is thus not of the nature of peptone. It is, however, present in kephir, and in "long-milk" (a preparation made from milk in Upper Scandinavia). Other portions of milk were precipitated with tannic acid, and the filtrate was found to contain only such small quantities of nitrogen as would be accounted for by the urea, hypoxanthine, and other non-proteïd constituents; albumoses are absent therefore.

The method of estimating the total nitrogen in the precipitate produced by tannic acid, and multiplying this by 6·37 to obtain the total proteïds, is recommended as the most accurate method in quantitative investigations of proteïds, and is stated to produce less error than the more usual methods involving the washing, drying, weighing and incineration of proteïd precipitates.

In order to estimate the caseïn and lactalbumin separately, rennet and various salts added to saturation have been recommended; these were all tested, and magnesium sulphate was found to be the best; it precipitates all the caseïn and the trace of lactoglobulin which is seemingly disregarded, and leaves all the albumin in solution. Sodium chloride was also found to precipitate all the caseïn. The albumin has been estimated by others, by weighing the precipitate produced by boiling after the separation of the caseïn. But boiling was found to be a very incomplete method of precipitating it; much nitrogen occurring in the filtrate after its removal. It is suggested that boiling lactalbumin and other proteïds split them (as Hammarsten found with fibrinogen) into an insoluble proteïd which is precipitated, and a soluble one which is left in the filtrate. It was found that solutions of pure caseïn when heated do not coagulate, but become opalescent, becoming clear again, however, on cooling. With regard to colostrum, many contradictory statements are quoted as to the relative amount of caseïn and albumin. By the present method it is found that the amount of these two proteïds is very variable; that the quantity of globulin is very considerable, and that the non-proteïd nitrogenous constituents are more abundant than in milk.

The following method was adopted in the analysis: (1.) Total nitrogen first estimated in the colostrum. (2.) Proteïd nitrogen estimated

in the tannic acid precipitate. (3) Nitrogen in the precipitate produced by saturation with magnesium sulphate (caseïn + globulin). (4.) Caseïn nitrogen estimated in the precipitate produced by adding acetic acid to milk. (Approximate.) (5.) Globulin nitrogen; two estimations; maximal, obtained by the difference of (3) and (4); minimal, estimated in the precipitate produced by magnesium sulphate after separating the caseïn by saturating with sodium chloride. (6.) Albumin-nitrogen, estimated in the precipitate produced by adding tannic acid to the filtrate after the separation of the proteïds, precipitated by magnesium sulphate saturation. (7.) Non-proteïd nitrogen is the difference between (1) and (2).

The following table gives the results in the analysis of five specimens of colostrum:

	(1.)	(2)	(3.)	(4.)	(5.)	(6.)	(7.)
1.....	1·232	1·025	0·887	—	0·100	0.138	0·207
2.....	2·506	2·269	2·02	0·56	0·248 1·46	0·25	0·237
3.....	2·566	2·461	2·147	0·534	1·604 1·613	0·314	0·086
4.....	2·222	2·086	1·903	0·718	0·3 1·185	0·183	0·076
5.....	1·10	—	0·716	0·55	0 081 0.166	—	—

PEPSIN IN NORMAL AND PATHOLOGICAL URINE.[1]

By E. Stadelmann.

A proteolytic ferment acting like pepsin in an acid medium has been found by many observers in urine. Neumeister (1888), brought forward a proof that this is pepsin, when he showed that in Carnivora injection of primary albumoses into the circulation caused the appearance of deuteroalbumose in the urine; and deuteroalbumose when injected was similarly converted into true peptone.

In the present research, the question whether the ferment is pepsin or another ferment something like pepsin was investigated by performing experiments with the ferment outside the body on fibrin; and the results may be thus summarized:

(1.) The ferment is true pepsin, as by its action all the products of

[1] *Zeit. Biol.*, xxv., 208–231. Reprinted from *Jour. Chem. Soc.*, April, p. 430.

peptic digestion are formed; protoalbumose, heteroalbumose, deuteroalbumose, and peptone. (2.) If, however, the solution contain but little ferment, the only products of digestion are acid-albumin and small quantities of the primary (proto- and hetero-) albumoses; and, indeed, these products can be obtained by the action of 0·25 per cent. hydrochloric acid without any pepsin or raw fibrin; the same strength of acid has no action on boiled fibrin; but 1 per cent. hydrochloric acid acts energetically by itself on boiled fibrin, forming even deuteroalbumose and peptone.

The influence of small quantities of various salts on tryptic digestion has been investigated by Nasse (*Pflüger's Archiv.*, xi.), Heidenhain (*ibid.*, x.), and A. Schmidt (*ibid.*, xiii.). This same question is here investigated for peptic digestion. A number of specimens, each containing the same amount of artificial gastric juice and fibrin, were taken, with different amounts of various salts, and the time noted in which solution of the fibrin occurred. A concentration equal to 0·02 per cent. of various urates was found to exert inhibiting influence on the action of pepsin; much smaller percentages (0·004) of sodium sulphate, potassium sulphate, ammonium sulphate, and magnesium sulphate produced the same effect, whilst sodium chloride and sodium phosphate only exerted a similar action when present to the extent of 0·01 per cent.

The urine of various patients was investigated as follows: The urine was divided into three parts: (1) was diluted with 0.25 per cent. hydrochloric acid in the proportion of 1 of urine to 3 of dilute acid; (2) fresh, raw fibrin was added to extract the ferment, the fibrin was then washed and digested in 0·25 per cent. hydrochloric acid; (3) was the control specimen; it was treated as in (1), but was also boiled, fibrin being then added to each. Trypsin was sought for but never found. In fever patients, pepsin seems never absent from the urine; this includes typhoid fever, in which some have failed to find the ferment. Also in severe cases of stomach disease, including cancer, pepsin was often found. No diagnostic value can therefore be attached to the presence or absence of pepsin in the urine in cases of disease.

Iodized glycerin is a mixture of tincture of iodine and glycerin, which considered by Dr. G. Hammond to be more effectual than the tincture, is possibly because the evaporation of the iodine is prevented.—*Jour. Am. Med. Assoc.*, March 9, 1889.

GLYCERITES OF FERROUS SALTS.[1]

By Charles Arthur.

Liquid preparations of ferrous salts, such as the syrup of iodide of iron, have always been a source of difficulty and trouble to pharmacists. This is due to the facility with which such solutions absorb oxygen, and become changed into the ferric condition, and many suggestions of a more or less satisfactory kind have from time to time been made to obviate this objection. The plan now generally adopted, and the one which has been perhaps most successful is the addition of a small percentage of free hypophosphorous acid; even this, however, is not always found to be satisfactory. It is well known that glycerin possesses the property of preventing oxidation of ferrous salts, and even of reducing ferric salts to the ferrous state. Its sweetness also makes it a convenient substitute for sugar. From these properties it occurred to me that it would be a very suitable vehicle for a preparation analogous to the official syrupus ferri iodidi, and at the same time free from the objections to which the latter is liable. Some time ago I first prepared several such preparations, to which, following the example of the U. S. Pharmacopœia, I have applied the name glyceritum or glycerite, and after a considerable experience they have proved satisfactory.

Referring to the literature on the subject, I observe that the idea has occurred to others as well as myself. M. Veza (U. S. Dispensatory, p. 1796) gives a formula for a 20 per cent., and S. Plevani (Year Book, 1885, p. 266), a 23 per cent. solution of ferrous iodide in glycerin.[2] These suggestions do not however seem to have attracted general attention, and I have thought it might be useful if I were to bring before you some of my experience, and one or two working formulæ. The formula for glyceritum ferri iodidi from which I have been accustomed to work is designed to yield a product containing 10 per cent. of ferrous iodide, but adapting the proportions to the standard of the syr. ferri iodidi B. P., the following formula will be found to work well:

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[1] Read before the Pharmaceutical Society of Great Britain at an Evening Meeting in Edinburgh, Tuesday, April 9; reprinted from *Phar. Jour. and Trans.*, April 20, p. 341.

[2] The substitution of glycerin for syrup was first recommended by Fr. Stearns (see Am. Jour. Phar., 1857, p. 522); and for a portion of the syrup, by Dr. Henry Thayer, in Amer. Jour. Phar., 1858, p. 390.—Editor.

GLYCERITUM FERRI IODIDI.

Take of iron	1 oz.
" iodine	2 ozs.
" distilled water	3 fl. ozs.
" glycerin	27 fl. ozs., or a sufficiency.

Mix two ounces of the water with an equal volume of glycerin in a flask, and in this mixture digest the iodine and iron, heating slightly, and occasionally shaking until the froth becomes white, then filter the liquid into 16 fluidounces of the glycerin, rinse the flask and iron wire, and wash the filter with the remaining ounce of water. There is no provision in the B. P. for washing the filter, hence there is loss of iodide. Mix and make up the measure of the product when cold to 31 fluidounces. Its specific gravity should be about 1·300. It contains 4·3 grains ferrous iodide in 1 fluid drachm.

The specific gravity of glycerin varies slightly, and where the strength and dose are calculated on the fluid measure it ensures greater accuracy to make up the product to a definite quantity as above, than to a definite weight, as in the case of the official syrup. ferri iodidi.

Another syrup for which there has been some demand, and which has also been a source of annoyance to many pharmacists, is the syrup of bromide of iron. I have had entirely satisfactory results with a glycerite of this containing 5 grains of ferrous bromide in the fluid drachm. It is made by the following formula:

GLYCERITUM FERRI BROMIDI.

Take of iron	385 grains.
" bromine	770 "
" distilled water	3 fl. ozs.
" glycerin	26 fl. ozs.

Proceed in the same way as for glyceritum ferri iodidi. This glycerite contains about 5 grains in the fluid drachm, and has a specific gravity of about 1·300.

The same idea can, of course, by suitable manipulation be applied to liquid preparations of other ferrous salts, such as hypophosphite, phosphate, protochloride and sulphate, and to mixtures containing any of these.

On the same lines, a couple of years or so ago, I prepared a substitute for Blaud's pills by making a glycerite of ferrous sulphate and a syrup of carbonate of potash, 5 grains of each in the drachm, but such a preparation has the disadvantage of being more difficult to manage than pills.

So far as appearance, taste and properties are concerned, these glycerite preparations are all that could be desired. They have recently been used to a considerable extent in hospital and private practice. I am able to state that Dr. Carmichael, of Mansfield Place, Edinburgh, has used the glycerite of iodide of iron pretty extensively of late, and I have further testimony regarding the glycerite from Dr. Jamieson, resident physician, in the University wards under Professor Greenfield, Edinburgh Royal Infirmary. He says the drug is extremely palatable in this form, whereas in the other form it is not, and that all the properties of the drug are retained, and that it agrees extremely well with strumous children.

Dr. Lockhart Gillespie, resident physician in Dr. Claud Muirhead's ward, Royal Infirmary, says that it makes a very nice compound, which to all appearance has good keeping properties, and serves as a good tonic for convalescing patients. Dr. Gillespie states that he hopes to give these preparations an extended trial in diseases of children during the coming summer, when he will be physician to the Sick Childrens' Hospital, Edinburgh.

I would submit one or two points in favor of the ferrous liquids being prepared with glycerin.

Glycerin is not objectionable, but the reverse, in all cases in which ferrous salts are used. Bromides and iodides are said to be useful in diabetes, but, of course, as syrups, could not be given; compounded as glycerites, however, the sugar objection is at once overcome. Some medical authorities are said to be averse to the administration of sugar to strumous patients. Syrup frequently causes acidity. Glycerin prevents it.

In the 1885 formula for the official syrup of iodide of iron, a portion of the sugar is changed into invert sugar by boiling, with the view of retarding oxidation. I would suggest that instead of this a certain proportion of glycerin should be added. I believe this would be quite as effectual and less objectionable than hypophosphorous acid. But I trust I may be excused for suggesting that it might be worth while considering whether the syrup might not be discarded altogether, and the glycerite substituted.

Phenacetin has been found of some value in whooping cough. Dr. Heimann gave as much as fifteen grains of it to children of about four years, without observing any ill effect.—*Münch. Med. Woch.*

NOTES ON ESSENTIAL OILS FROM MESSRS. SCHIMMEL AND CO.'S REPORT.*

(*Continued from page* 314.)

Citronelle Oil.—The exports of this oil from Ceylon during the year 1888 are estimated to have amounted to at least double the exports of the previous year, since in the month of August alone the shipments reached 2,322,890 ounces, or four times the average of the same month in the three previous years. This enormous export from Ceylon is driving the production of the oil in the Straits Settlements into the background.

Almond Oil.—Under this head reference is made to the advantage that would result in the improved color of almond oil if a practical method of blanching the almonds could be introduced. It would be an indispensable condition that the almonds should not require to be moistened, because otherwise the formation of the essential oil of bitter almonds would be induced and the fixed oil would acquire a strong bitter taste and contain a trace of hydrocyanic acid.

Cassia.—With respect to cassia oil Messrs. Schimmel state that the greater part of that found at present in commerce is sophisticated in the most shameful manner. The oil appears to be obtained by the dealers in Hongkong, Macao, and Canton through native agents who get it direct from the Chinese who produce it. As to the particular place from which it comes no information is available; only this is certain, that it is not manufactured in Macao, the place designated on all the labels. It is therefore thought most probable that it is sophisticated by the producer, and sent in this condition into the market. In Hongkong it is the custom among the dealers to have the oil examined in a "medical hall" and its genuineness certified. The value of this guarantee may be judged from the fact that a sample certified to be unadulterated oil of cassia, 1·060 sp. gr., dissolving readily in alcohol of 80° Tr. and perfectly volatile, proved to contain 20 per cent. of solid resin—colophony or pitch—and a corresponding quantity of petroleum, probably added to regulate the specific gravity and consistence. The three following brands are mentioned as having been found grossly adulterated: yellow label with the American eagle: Yan Loong, Macao; yellow label with sailing-vessel: Cheong Loong, Macao; rose-colored label with wreath of flowers: Luen Tai, Macao. The oil was noticeable superficially for its dark brown color and consistency. Upon shaking it in a flask it remained adherent to the sides for a long time. The specific gravity corresponded tolerably well with the statement in the certificate, varying between 1·052 and 1·065. The boiling-point lay between 200° and 265° C. As a residue after distillation there remained in the retort from 23 to 26 per cent. of a solid brittle resin. In order to exclude any doubt as to whether this resin might possibly have resulted through heating over an open fire, several canisters of each of these brands of oil were submitted to distillation in a current of steam. The greater part of the distillate sank in the water, but a portion collected on

* From the April *Bericht* of Messrs. Schimmel and Co. of Leipzig; reprinted from *Phar. Jour. and Trans;* April 6 and 20.

the surface and this lighter portion was identified as petroleum. In the residue after distillation there was found from 19 to 26 per cent. of the same solid brittle resin. On the other hand, a brand bearing a red label with the words, "Best Cassia Oil, Ying Chong, Macao," has been found to be of good quality, the loss on rectification being only 7 per cent., and the residue being liquid. The rectified oil should have a specific gravity of 1·055 to 1·065.

Eucalyptol and Eucalyptus Oil.—The demand for pure crystallized eucalyptol, for medicinal purposes, is said to be continually increasing. Of the *Eucalyptus Globulus* oil there seems to be a probability of over production, the yield from upwards of 3,000,000 trees in Algeria being now available, besides the Californian oil, which is already placed with difficulty. The use of the ordinary eucalyptus oil as a perfume is criticized and a passage is quoted with approval from Piesse's 'Art of Perfumery,' to the effect that so long as perfumery is an art of sweet odors such an oil cannot be described as a perfume. More favorable mention is made of oils distilled experimentally from *Eucalyptus maculata*, var. *citriodora*, and *E. Staigeriana*, as having a beautiful melissa odor; from *E. dealbata*, as having a fine lemon and melissa odor; and from *Backhousia citriodora*, as having an intense verbena odor. The cost of the materials is, however, too great to allow of these oils being produced as commercial articles. Another oil, of which samples have been received recently from Adelaide, South Australia, is described as having been distilled from the leaves of *Eucalyptus odorata*, a material of which there is an abundance available. The samples included the crude oil, sp. gr. 0·903 at 16° C., and the rectified oil, sp. gr. 0.909 at 18° C., both of which gave a strong eucalyptol reaction with hydrobromic acid, but no phellandrene could be detected. In addition there was some "residue from the rectification," which appeared to be the portion of the oil having the highest boiling point (boiling between 220° and 260° C.). This fraction, which is a brown liquid and has a sp. gr. of 0·945 is said to be sought after in Australia as a soap perfume. The odor is said to strongly resemble that of cuminol, the presence in it of which body has been detected.

Eucalyptol (Cineol) appears to be one of the most widely-distributed constituents of essential oils. Up to the present it has been found in the following oils:—

Oil.	Origin.	Discoverer.
Wormseed	*Artemisia Cina*	Wallach and Brass.
Cajeput	*Melaleuca Leucodendron*	Wallach.
Eucalyptus	*Eucalyptus globulus*	Jahns.
	E. amygdalina	Wallach and Gildemeister.
	E. Bayleyana	Schimmel and Co.
	E. microcorys	Schimmel and Co.
Rosemary	*Rosmarinus officinalis*	Weber.
Spike	*Lavandula spica*	Voiry.
Cheken leaves	*Myrtus Cheken*	Weiss.
Myrtle	*Myrtus communis*	Jahns.
Camphor	*Laurus Camphora*	Schimmel and Co.

Geranium Oil, Turkish.—This essential oil is said to be sometimes adulterated with fixed oils, cocoa-nut oil being used not unfrequently to the extent of 20 per cent. The adulteration can be detected by standing the flask con-

taining the oil for some hours in a cooling mixture, when the cocoa-nut oil separates as a white substance.

Hop Oil.—The oil distilled from the unsulphured hops is said to be in good demand, whilst that distilled from lupulin appears to have gone quiteout of use.

Iris Oil.—In the distillation of iris root the method of adding sulphuric acid in order to convert the starch into dextrin and glucose is frequently followed. In this way the yield of oil is increased, but the delicacy of its odor is said to be injured. The pure oil, free from myristic acid, which is largely present in commercial specimens, is described as worth its weight in gold.

Kesso-root Oil.—The Kesso root which in a previous report (see before, p. 327) was designated "Japanese valerian root," and attributed to *Patrinia scabiosæfolia*, Link., has been the subject of a communication from Mr. J. Murai, of Tokio. He says that the *Patrinia scabiosæfolia*, called by the Japanese "Ominameshi," and by the Chinese "Hai-sho"—literally, putrid soy—grows wild throughout Japan, but is collected for medicine only to a slight extent. The root is whitish, larger and harder than that of *Valeriana officinalis*, and does not smell so strongly after having been exposed to the air. Some *Patrinia* root collected and submitted to distillation last year by Mr. Murai yielded 0·25 per cent. of a deep green oil, having an odor quite different from that of valerian oil. On the other hand the Japanese valerian ("Kesso" or "Kanokoso") and the European valerian, both cultivated in the Botanical Gardens, Tokio, yielded respectively 3·78 and 1·69 per cent. of oil. He believes therefore that probably the "kesso root" distilled by Messrs. Schimmel was from *Valeriana officinalis*, L., var. *angustifolia*, and not from *Patrinia scabiosæfolia*, Link. In this opinion Messrs. Schimmel concur, since the "kesso root" worked by them was strikingly similar to European valerian root, and did not correspond to the above description of *Patrinia* root. The yield of oil obtained, however, from the sharply-dried root was about 8 per cent., though it is thought that this great difference in the yield may be due to Mr. Murai having used fresh undried root.

Petitgrains Oil.—The over-production of this article in Peru has greatly affected its value, and in large parcels it is said to be now quite unsaleable. In view of the possibility of stock remaining on hand a long time a hint is given as to the superiority of recent distilled oil.

Peppermint Oil.—In the case of peppermint oil also the consumption is considered not to stand in any sound relation to its enormously increasing production. The following is an estimate of the production of this oil in different parts of the world in 1888:—

	Kilos.
America—New York State	about 35,000
" Michigan State	" 27,000
England—Mitcham	" 5,000
" Cambridge and Lincolnshire	" 1,400
Japan	" 64,000
Italy	" 1,200
France	" 4,600
Germany	" 400
Russia	?
Total	138,600

Two samples of Italian peppermint oil examined gave the following results:—(1) "Foglie de Menta:" sp. gr. 0·921 at 19°; boiling point about 195°–222°; 44 per cent. distilled between 195° and 210°; 37 per cent. between 210° and 222°; residue 19 per cent. (2) "Fiori di Menta:" sp. gr. 0.915 at 190°; boiling point about 195°–222°; 57 per cent. distilled between 195° and 210°; 36 per cent. between 210° and 225°; residue 19 per cent. Neither sample gave a separation of menthol upon being placed in a freezing mixture. It is considered that according to these results both these oils range in quality below fine American oils. A sample of Russian peppermint oil gave:—Sp. gr. 0·908 at 20°; boiling point about 195°–222°; 46 per cent. distilled between 195° and 210°; 40 per cent. between 210° and 222°; residue 14 per cent. Placed in a cooling mixture the oil formed a thin paste; it contained consequently a small quantity of menthol.

Rose Oil.—Information is given as to the properties of a pure rose oil, and especially as to the characteristic stearoptene and the possible introduction of spermaceti. The stearoptene of rose oil is a hydrocarbon, C_nH_{2n}, which is not altered by boiling with alcoholic potash solution, whilst spermaceti, which is essentially palmitic-cetyl-ether, is saponified by that reagent, with the formation of potassium palmitate and cetyl alcohol. Upon this fact Messrs. Schimmel have based a method for the examination of the oil.

(1) Isolation and determination of the stearoptene. Fifty grams of oil are heated with 500 grams of 75 per cent. spirit to a temperature of 70° to 80°. Upon cooling the stearoptene separates nearly entirely. It is removed from the liquid and treated similarly with 200 grams more of 75 per cent. spirit, and this operation is repeated until the stearoptene is obtained perfectly odorless, a second treatment of the crude stearoptene being usually sufficient. In this way the following results were obtained with different samples of German and Turkish oil.

	Grams oil.	Grams stearoptene.	Per cent.
German, 1887	50	gave 16·2	—32¼
" 1888	50	" 16·9	—34
Turkish, 1887	50	" 6·3	—12-13
" 1888	50	" 6·9	—14

(2) Determination of an Admixture of Spermaceti.—3–5 grams of the stearoptene are boiled for five or six hours in a return condenser with 20 to 25 grams of 5 per cent. alcoholic potash solution; the alcohol is then driven off and the residue treated with hot water. Upon cooling the greater part of the stearoptene separates on the surface as a crystalline mass. The alkaline liquor is then poured off, the stearoptene washed with some cold water, then again melted down with hot water, allowed to cool and the water poured off, and this is repeated until the wash-water is neutral. The united aqueous liquor is shaken twice with ether, to remove suspended stearoptene, and after separation of the ether is acidulated with dilute sulphuric acid and again extracted with ether, which upon evaporation should leave no residue (fat acid). As a check the stearoptene, including that withdrawn from the alkaline liquid, is dried at 90° and weighed. There will, however, be a small loss due to the volatilization of some stearoptene. In a control experiment

in which equal to 1·7 per cent. of spermaceti was added to a sample of Turkish oil 1·5 per cent. was recovered.

The melting-points of stearoptene from samples of German rose oil ranged from 35° to 36·5°; those of stearoptene from Turkish oil from 33·5° to 35°; that of the stearoptene from the oil to which 1·7 per cent. of spermaceti had been added was 31·5°–32°.

Rose oil, from which stearoptene has been removed in the above-described manner, is perfectly liquid at 0°; but when placed in a cooling mixture it solidifies to a gelatinous mass, so that it is not quite free from stearoptene. This liquid oil is described as having an extraordinarily fine powerful odor, and as presenting the advantage that when used dissolved in spirit it does not give rise to any crystalline separation.

The following new oils have been prepared experimentally by Messrs. Schimmel during the last six months:—

Mountain Wormwood Oil.—A distillate of the herb *Artemisia glacialis*, known in commerce as "genepi herb" (*genepi des alpes*). One hundred kilograms of the herb yielded 250 grams of an essential oil sp. gr. 0·964 at 20°, which solidified to the consistence of butter at 0°, in consequence of it containing a fat acid melting at 61° C. The boiling point of the oil was between 195° and 310°. It had an unusually powerful aromatic odor, and it is thought it might be suitable for making "Benedictine" and "Chartreuse," for which purpose the herb is said to be used in France.

Bear-root Oil.—Distillate of the root of *Meum anthamanticum*, Jaq. 100 kilos of the dried root of commerce gave 670 grams of a dark yellow essential oil, the odor of which much resembled that of lovage. Sp. gr. at 21° 0·999. It commenced to boil at 170°, but the temperature mounted to above 300°, when a green-blue fraction passed over, having a celery odor.

Carlina Root Oil.—Distillate of the root of *Carlina acaulis*. From 100 kilos of dried root was obtained 2 kilos of an essential oil having a heavy narcotic odor, of which one-half boiled between 265° and 300°, when decomposition commenced; the remainder resinified. Sp. gr. 1·030 at 18°. This oil is recommended as worthy of a scientific investigation.

Muscatel Sage Oil.—Distillate of the herb and flowers of *Salvia sclarea*, the so-called "muscatel sage," a plant growing wild in Southern Europe and the east, and cultivated in South Germany. The oil has the characteristic spicy odor and taste of the herb. The yield amounts to only one-fifth per cent., and probably the cost of its production would be too high to allow of it coming into practical use.

Onion Oil.—The pure essential oil of the common onion (*Allium Cepa*). About 5000 kilos of onions yielded 233 grams of a red-brown oil, sp. gr. 1·036 at 19°. The same yield leads to the presumption that during distillation a loss occurs through decomposition. On the other hand, as the onion consists of 90 per cent. of water and only 10 per cent. of solid substance, the result from this point of view appears less unfavorable.

The following distillates have been received from Japan:—

Hinoki Oil.—The essential oil from *Retinospora obtusa*, a plant occurring frequently in Japan, resembling savin or thuja oil in odor. Probably with-

out practical value. The low boiling point of this oil is remarkable: about one-half of its volume passes over between 110° and 160° C. and the remainder between 160° and 210°.

Kuro-moji Oil.—Essential oil from the leaves of *Lindera sericea*, Bl., a lauraceous shrub widely distributed in Japan. The oil has a very fine aromatic balsamic odor, and might, it is thought, find use in perfumery, especially as it is not expensive. Sp. gr. 0·901 at 18°. A sample separated by distillation into three fractions gave (1) between 180° and 200°, a fraction having the agreeable odor of myrtle and coriander; (2) boiling between 200° and 220°, a fraction with an agreeable balsamic odor, recalling somewhat lign-aloe oil, but finer and more fragrant; (3) boiling between 220° and 240°, a fraction resembling the carvol contained in curled mint.

Coumarin.—The following list of plants in which the presence of coumarin has been detected, is quoted from a communication by H. Lojander upon the distribution of coumarin in the vegetable kingdom:—

Orders.	Genera and species.	Part of plant.
Filices	*Adiantum pedatum*	Plant.
	A. peruvianum	Plant.
	A. trapeziforme	Plant.
Palmæ	*Phœnix dactylifera*	The date.
Gramineæ	*Anthoxanthum odoratum*	Flowers.
	Cinna arundinacea	Plant.
	Hierochloa alpina	Plant.
	H. australis	Plant.
	H. borealis	Rhizome.
	Milium effusum	Plant.
Orchidaceæ	*Aceras anthropophora*	Plant.
	Angræcum fragrans	Leaves.
	Nigritella angustifolia	Plant.
	Orchis fusca	Plant.
Caryophyllaceæ	*Herniaria glabra*	Plant.
Rutaceæ	*Ruta graveolens*	Plant.
Papilionaceæ	*Dipterix odorata*	Ripe seed.
	D. oppositifolia	Ripe seed.
	D. Pteropus	Ripe seed.
	Melilotus albus	Flowers and plant.
	M. altissimus	Flowers and plant.
	M. hamatus	Flowers and plant.
	M. leucanthus	Flowers and plant.
	M. officinalis	Flowers and plant.
Cassiaceæ	*Toluifera balsamum*	Fruit.
Apocynaceæ	*Alyxia stellata*	Bark.
Rubiaceæ	*Asperula odorata*	Plant.
	Galium triflorum	Plant.
Compositæ	*Liatris odoratissima*	Plant.
	L. spicata	Plant.

In addition, Molisch and Zeisel have reported the occurrence of coumarin in *Ageratum mexicanum*, Sims. This plant, when dry, smells of coumarin, of which it yielded 0·06 per cent.; but when in fresh condition, has quite another odor, probably derived from an essential oil.

Thymol.—Reference is made to the occurrence in commerce of thymol containing thymene, which can be recognized by its odor, or by the oil stain

left upon pressing a fragment between blotting paper. The following method is given for its more exact determination: Pure thymol dissolves clear in five times its weight of 10 per cent. soda solution when heated to 30° or 40° C., the solution being colorless or faintly reddish, but darkening upon standing. If the thymol contains thymene it gives a more or less turbid solution, from which the thymene separates in the form of oil drops.

Musk.—The following information as to the manner in which musk comes into commerce is quoted from a report by the German consul at Shanghai: "The article comes into the market in simple wood cases of 9 to 14 catties. Every parcel contains a number of adulterated pods, which have also to be bought. The parcels are then, as a rule, broken up by the exporter and sorted for the London market. On an average they give about 50 to 55 per cent. of 'pile I,' a fine thin-skinned article; 20 to 30 per cent. of 'pile I and II,' partially or entirely falsified pods; and 20 to 25 per cent. of skin refuse and loss of weight. The sophistication consists of earth, rasped wood, and small pieces of leather or skin, which are inserted in the pods after the musk has been removed. Less frequently the sophistication is effected with lead, heavy pieces of flesh, or paper inserted between the thin inner and thick outer skin, which can only be discovered upon cutting it. In the last year or two the adulteration has gone up to 80 per cent., but in the absence of better qualities, even such an article has found buyers."

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

Louisville College of Pharmacy.—The Board of Directors has purchased the property on the S. W. cor. of First and Chestnut streets, which has a frontage of 200 feet and depth of 150 feet; the building is one of the handsomest in the city, and well adapted for the college. A pharmaceutical and a microscopical laboratory will at once be added. The college will take possession of the property about July 1st, on which occasion it is proposed to give an old-fashioned house warming.

St. Louis College of Pharmacy.—The vacany occasioned by the resignation of Professor Curtman has been filled by calling Professor Gustavus Hinrichs, M. A., LL. D, to the chair of chemistry. Professor Hinrichs for a number of years has held the chairs of chemistry, toxicology and climatology in the medical and pharmaceutical departments of the University of Iowa. His experience as a teacher and his reputation as an author give ample promise of his usefulness in this new sphere of labor.

The School of Pharmacy, University of Kansas, celebrated its fourth anniversary June 3rd, the exercises consisting mainly of orations and addresses.

The Alabama Pharmaceutical Association held its eighth annual meeting at Birmingham May 14th, Vice-President G. W. Bains in the chair. Reports were received from officers and committees and papers were read on carbonate of ammonium and the National Formulary. The present officers are: President, G. W. Bains, Birmingham; Vice-Presidents, W. F. Punch, Mobile, and J. Milner, Florence; Secretary, P. C. Candidus, Mobile, and

Treasurer, E. P. Galt, Selma. The next meeting will be held at Tuscaloosa, May 13, 1890.

The Arkansas Association of Pharmacists held its seventh annual meeting at Little Rock on June 11-13, called to order by President Kerr. The president's address was mainly devoted to the causes that defeated the pharmacy law at the last session of the Legislature, and to suggestions which would lead to the passage of a law at the next session. A committee was authorized to prepare a line of pharmaceuticals made according to the National Formulary to be exhibited before the State Medical Society. The papers read at the meetings were: Some of the Difficulties in Compounding Prescriptions by John Laird; Chemistry and Some of its Pigments by E. T. Mitchell and Syrups by Percolation by J. A. Jungkind. The officers were re-elected for the ensuing year, and are: President, W. W. Kerr, Batesville; Vice-Presidents, J. E. Gibson, Little Rock, and E. E. Shendall, Hot Springs; Secretary, J. W. Beidelman and Treasurer, E. P. Shaer, both of Little Rock. Pine Bluff was selected for the place of meeting one year hence.

Proceedings of the Connecticut Pharmaceutical Association at the thirteenth annual meeting &c., 8vo. Pp. 99.

A brief account of the transactions will be found on page 222 of our April number. Next meeting at Danbury, February 4 and 5, 1890; F. G. Bodine, local secretary.

The Delaware Pharmaceutical Association met in Wilmington, May 2. Trade interests and the pharmacy law were the main topics discussed. The executive officers were re-elected for the current year, viz.: H. R. Bringhurst, president; J. M. Harvey, secretary; J. J. Gallagher, treasurer, and H. C. Moore, local secretary, all of Wilmington.

The Kansas Pharmaceutical Association assembled at its tenth annual meeting in Atchison, May 15th, President W. W. Naylor in the chair. The president's address and the reports of officers and committees were received and action taken thereon. Among the papers read the following may be mentioned: Medicated waters, by R. L. Igel; commercial quinine, by E. L. Beckers; commercial caustic soda and potash, by G. F. Weida; commercial alum, by Mary A. Rice; cocaine, by W. P. Brown; adulterations and impurities, by H. L. Raymond; organic compounds and calomel, by Professor E. H. Baily; on the National Formulary, by C. L. Condery and F. Edel; coloring matters of red saunders, by H. M. Curry; Pharmaceutical Education, by Professor L. E. Sayre. The officers elected to serve for the present year are J. P. Allen, Wichita, president; C. D. Barnes and S. H. Horner, vice-presidents; J. T. Moore, Lawrence, secretary; A. T. Waggoner, Topeka, assistant secretary, and H. W. Mehl, Leavenworth, treasurer.

The Kentucky Pharmaceutical Association held its twelfth annual meeting, May 15 and 16, at the Crab Orchard Springs, President W. F. Johnson in the chair. The President's address and the reports of officers and committees were received. An amendment to the pharmacy law was recommended, extending its provisions to towns of 100 inhabitants. The subject of cut prices

was discussed in its various bearings. Papers were read by Dr. J. P. Barnum on the Mineral Waters of Kentucky, and by W. Chapman on Fluid Extract of Liquorice suitable for quinine mixtures. The following officers were elected: E. C. Pfingst, Louisville, president; J. J. Brooks, Richmond, W. B. McRoberts, Stanford, and C. F. Edmunds, Glasgow, vice-presidents; J. W. Gayle, Frankfort, secretary; and E. W. Lillard, corresponding secretary; and W. S. Johnson, Henderson, treasurer. The next meeting will take place at Richmond on the third Wednesday of May 1890.

The Nebraska Pharmaceutical Association convened at its eighth annual meeting in Lincoln, May 1st, President Shryock in the chair. The address of the president, the report of officers and committees, and various matters, under the head of trade interests claimed the attention of the meeting: Papers were read on Household Poisons, by Prof. Nicholson; on the Microscope, by Prof. Whelpley; on the Waters of Nebraska, by A. H. Keller; and on Fluid Extracts, by C. L. Mullen. Mr. C. F. Goodman of Omaha, was elected president; C. J. Daubach, Lincoln, secretary; Jas. Forsyth, Omaha, treasurer and S. A. Hereth, Omaha, local secretary for the meeting to be held at Omaha on the second Tuesday of May, 1890.

The Ohio Pharmaceutical Association convened in annual session in Mansfield on June 4th, President Fulton presiding. The first day's sessions were devoted to the reading of the president's address and the reports of the other officers and committees; the election of officers, resulting as follows: President, L. Sherwood, Columbus; Vice-Presidents, A. H. McCullough, Mansfield, and F. M. Heath, White House; Treasurer, F. A. Kautz, Cincinnati; Executive Committee, Philip Acker, Cleveland, J. H. Von Stein, Sandusky, and M. A. Burkhardt, Dayton; and the reading of the following papers: Uncertain Medicines by J. U. Lloyd, Nux vomica by W. Simonson and Powdered Borax by Mary H. Spenzer. In the second day's sessions, next year's meeting was decided to be held at Toledo, on the second Monday in June; six papers were read: Three on Commercial Glycerin by E. S. Ely, J. G. Spenzer and John G. Buehler; Glycerin: Vegetable and Animal by J. G. Spenzer; Ammonium Chloride by Mary H. Spenzer; and Commercial Chloride of Lime by E. A. and J. G. Spenzer. An interesting exhibit was one of the attractions.

The Pennsylvania Pharmaceutical Association held its twelfth annual meeting in the hall of the Young Men's Christian Association in the city of Scranton, commencing June 4th. President Wm. Harris presided; Dr. J. A. Miller, secretary. Mr. Morgan, chairman of the local committee, read a letter of welcome from Mayor E. H. Ripple whose time was now occupied with duties connected with the relief of the sufferers from the calamity in the Conemaugh Valley. President Harris responded and then read his annual address in which he referred to the various projects proposed for retaining and increasing the membership. He suggested the appointment of several new committees, viz. one on botany to promote its study, ascertain localities of plants and collect material for publishing a catalogue of Pennsylvania plants; also a committee on chemistry to promote its study by pharmacists; and one on remedies, to report annually upon such which

have been introduced during the years. Inter-state meetings of pharmaceutical associations were suggested as being productive of interest. The relations to the State Medical Association were alluded to, and legal measures were recommended for preventing the further spreading of secret nostrums and fraudulent medicines. The address was referred to a committee and several of the suggestions were subsequently adopted.

Propositions for membership were read, and during the meeting forty-nine new members were elected.

A resolution was passed inviting the members of the medical profession of Scranton and vicinity to attend the meeting.

The secretary's report showed a total amount of $1,345.01 having been received; the expenditures were $914.44, leaving a balance of $430.57 on hand.

The secretary's report dealt mainly with the published proceedings and with the roll of members.

The following officers were elected for the ensuing year and installed at the last session: President, J. W. Miller, Allegheny City; Vice-Presidents, J. H. Stein, Reading, and J. F. Patton, York; Executive Committee, J. H. Redsecker, C. T. George and Wm. Harris. Secretary Miller and Treasurer Lemberger were re-elected.

Greetings were ordered to be sent to the meetings of the New York, Ohio and Iowa associations.

Professor Trimble read the report of the Committee on Adulterations, of which an abstract will be found on another page.

Reports from various delegations and from special committees were received. Considerable discussion was created about a plan submitted with the view of securing to the pharmacist the full retail price of what was called "legitimate patent medicines." There was much opposition to the consideration by the association of any question relating to the recognition of nostrums; but finally a special committee was directed to be appointed for the purpose of reporting next year a feasible plan if such could be devised.

The interchange of certificates of pharmacy boards was not favored by the association; but the repeal of the special government tax for the sale of alcohol and the reduction of the tax on the manufacture of alcohol were approved.

The following papers were read during the sessions:

On the relation of pharmacists to the Sabbath, by J. W. Miller. The paper stated that a number of pharmacists of Allegheny County were fined for trivial sales under a special law applying to that county, and that efforts had been made, but without success, to repeal that special law. Considerable discussion was had on various details mentioned in the paper which was finally withdrawn, and a resolution was adopted urging druggists to confine their *Sunday business* to works of necessity and mercy.

The efficiency of pharmaceutical associations was discussed in a paper by Dr. Reed, and the need of a more thorough organization by pharmacists by W. L. Turner.

Tincture of strophanthus was recommended by Geo. W. Kennedy to be

made of the strength 1:20, using eighty-five per cent. alcohol for the menstruum.

Medicated waters. After experimenting with different materials, J. H. Stein prefers paper pulp for the division of the volatile oils.

Paste, suitable for attaching labels to metal or glass is prepared by J. F. Patton from flour, by converting the starch partly into dextrin by boiling in the presence of a little hydrochloric acid, and adding a small quantity of borax and alum, two drachms of each to one pound of flour. The addition of a little oil of gaultheria will prevent fermentation.

The preservation of infusions was in part reported on by J. L. Lemberger, who will continue his investigations. Mr. England's paper on infusion of digitalis is published in this number.

Glycerin suppositories are made by J. L. Lemberger by digesting a good quality of gelatin (gold label) in glycerin and pouring into brass molds thoroughly chilled. In this manner suppositories are readily made containing 90, and even 95 per cent. of glycerin, of which the former keep well in lycopodium, but the latter are best wrapped in tinfoil owing to their hygroscopic nature.

Six statistical papers on the drugs and preparations prescribed by physicians were referred for publication. Mr. Patton was granted time for finishing his paper, on the production of oil of sassafras in Pennsylvania, for the proceedings.

Poplar bark was the subject of a paper by C. A. Heinitsh. This name is popularly used for the bark of Liriodendron as well, as for that of Populus tremuloides. Both barks are to some extent employed in domestic medicine, and the last named bark is also used for the preparation of *salicin.*

A paper on the useful plants of the genus Psoralea by Prof. Maisch is published in the present number.

The following resolutions offered by Mr. Lemberger were adopted :

Whereas: A most dreadful calamity has befallen a portion of our State by flood, entailing death and destitution unparalleled in the history of our country, causing affliction, sorrow and loss beyond estimate, therefore be it

Resolved: That this association tenders an expression of sympathy for the afflicted and pledge our aid as individuals in our several communities to the fullest extent of our ability.

Resolved: That we feel especially solicitous for those of our members who may be afflicted by this sad visitation, and desire that they may realize our feelings in their behalf and in their absence.

After installing the officers, appointing different committees and passing resolutions of thanks the Association adjourned to meet next year in York on the second Tuesday of June. James A. Dale was elected local secretary.

On Wednesday morning the visiting members and their ladies were escorted to the Oxford coal mine, and in the evening a visit was made to the steel works. On Thursday an excursion was made to the Delaware Water Gap, whence the members returned to their homes.

The Texas Pharmaceutical Association met at its tenth annual meeting in

Dallas, May 14, President J. W. Gresham in the chair; L. M. Connor acting secretary. The president presented an address, and the different officers and committees made reports. The discussion of the pharmacy law resulted in the suggestion of several desirable amendments. Papers were read on antipyrine by J. Kennedy, and on mixtures of calomel and milk sugar by W. Kendall. The officers elected are J. L. Williams, Dallas, president; T. F. Meyer, W. B. Morrison and H. L. Carleton, vice presidents; L. M. Connor, Dallas, secretary; E. W. Marshall, Lancaster, treasurer; and F. Drice local secretary for the next meeting to be held in San Antonio on the second Tuesday in May, 1890.

EDITORIAL DEPARTMENT.

False senega and Southern senega.—In several essays on senega published during the past year the editor of this Journal has been quoted as having stated somewhere that "Southern senega is procured from Polygala Boykinii." The latest quotation of this nature is found in a very creditable paper by Ludwig Reuter in *Archiv der Pharmacie*, April 1889 p. 311.

In order to forestall similar erroneous references in the future we desire it to be noted, that we have *never*, in writing or verbally, made such an assertion. What we did say, and here repeat, is that false (keelless) senega was first noticed by us in 1876; that subsequently we traced a commercial lot to Southwestern Missouri, but were not successful in ascertaining the exact locality where it had been collected, or in obtaining specimens of the plant with root attached; and that after Dr. Gunn of Alabama called attention to the virtues of Pol. Boykinii, we obtained from him a single plant with root, the latter agreeing in appearance and structure with the false senega, though somewhat smaller than the commercial article of the keelless root. Since we have in our possession specimens of true senega root from several of the Southern states, it would be ridiculous for us to asert that Southern senega was not collected from Pol. Senega.

When at the meeting of the American Pharmaceutical Association in 1881 Prof. Loyd exhibited the Northern senega in which the keel was usually less distinct than ordinarily, we stated that these roots were much larger—and we might have added also much darker in color—than the keelless senega; and until the latter can be procured—plant with root attached—we feel disposed to regard it as being the product of a species differing from Pol. Senega, and possibly from Pol. Boykinii.

The Pennsylvania Pharmacy law has been supplemented by an act of which the following is a correct copy.

A Supplement to an act entitled "An act to regulate the practice of pharmacy and sale of poisons, and to prevent adulterations in drugs and medicinal preparations in the State of Pennsylvania," approved May twenty-fourth, one thousand eight hundred and eight-seven.

WHEREAS, a number of persons who were actually engaged in the retail drug and apothecary business in this State at the date of the approval of the act of May twenty-fourth, one thousand eight hundred and eighty-seven, failed to apply for registration within the limited period of ninety days provided for that purpose; therefore,

SECTION 1. *Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same,* That any person who was entitled to registration as a pharmacist, as provided in Section three of the act entitled "An act to regulate the practice of pharmacy and sale of poisons, and to prevent adulterations in drugs and medicinal preparations in the State of Pennsylvania," approved May twenty-fourth, one thousand eight hundred and eighty-seven, and who failed to apply for registration within ninety days as provided in said act, may make such application at any time within ninety days after the passage of this act, with the same force and effect as if such application had been made within the ninety days provided in the act of May twenty-fourth, one thousand eight hundred and eighty-seven.

Approved the fourth day of May, A. D. 1889.

In order to carry out the provisions of this supplementary act the State Board has issued the following circular dated May 4th, which also explains certain provisions of the law, which appear to be not generally understood:

The State Pharmaceutical Examining Board hereby gives notice to all persons who are actually engaged in the retail drug and apothecary business in Pennsylvania, either as proprietors or assistants, at the date of the approval of the Pharmacy Act of May 24th, 1887, but who failed to secure registration thereunder.

That a recently enacted supplement to said act re-opens registration for a period of ninety days after the fourth day of May, 1889.

The sole object and intent of the supplement is to re-open registration for such persons *only* as were entitled to register on May 24th, 1887, but who failed to apply within the ninety days provided in the original act, and only for such a certificate of registration as they were entitled to on May 24th, 1887.

Blank forms of application may be obtained from the Secretary of the Board, H. B. COCHRAN, Lancaster, Pa., to whom all applications for registration must be sent, accompanied by the registration fee of one dollar (either U. S. note, money order, or postal note). All applicants for blanks should state distinctly which certificate they desire to apply for.

Firms, as such, cannot register; each individual member of a firm must obtain a separate certificate. Titles, such as The City Drug Store, Empire Pharmacy, or the Union Drug Company, cannot be registered.

A printed card or label should be attached to the application for registration, in order to avoid possible error in spelling the name on the certificate.

The certificates will be furnished as promptly as possible; but even should no unforeseen cause of delay occur, several months time may be required.

Every registered proprietor or manager shall keep his certificate conspicuously displayed in his place of business.

Do not forget that the privilege of registration granted under the supplement will continue only ninety days after the fourth day of May, 1889.

This time will expire on the second day of August, 1889; the Board has no power to extend it.

General country storekeepers are not entitled to or required to obtain registration. A clause in section six of the act permits such storekeepers to deal in and sell the commonly used medicines and poisons, under certain restrictions, which are fully explained in a circular issued by this Board.

The Board desires to distinctly point out the fact that only such persons as were actually engaged in the retail drug and apothecary business in Pennsylvania, on May 24th, 1887, and who continue to reside in said State, are eligible for registration under the supplement.

An International Congress of Therapeutics and Materia Medica will be held in the city of Paris, France, August 1st to 5th next. Among the five subjects coming up for consideration are two of especial interest and importance to pharmacists, namely:

Question IV. The new drugs of vegetable origin introduced during the past ten years. Professor Planchon will report on this subject.

Question V. Unification of measures and weights in formulas, and the utility of an international pharmacopœia. Professor Schaer, of Zurich, will report on these subjects.

Communications intended for the Congress should be addressed to the Secretary of the Committee on Organization, Dr. G. Bardet, rue Notre Dame des Champs, 119, Paris.

The International Congress of Hydrology and Climatology will convene in Paris October 3rd to 10th next. The secretary general is Dr. F. de Ranse, whose address during the summer months is at Néris, Allier, France.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A Guide to Therapeutics and Materia Medica. By Robert Farquharson, M. P., M. D., etc. Fourth American from the fourth English edition, enlarged so as to include all preparations officinal in the U. S. Pharmacopœia, by Frank Woodbury, A. M., M. D., etc. Philadelphia: Lea Brothers & Co., 1889. 12mo. Pp. 598. Price, $2.50.

The introductory portion treats of the different methods of medication; the writing of prescriptions; weights and measures; classification of drugs, etc. The drugs are arranged in alphabetical order, the galenical preparations being considered with the drugs. The work being primarily intended for the use of the physician, and more especially of the medical student, the text is mainly devoted to the physiological action of the drugs, their therapeutical uses, mode of administration, necessary precautions, antidotes, etc.; and great care has been taken to make the information comprehensive and practical, embodying all that is essential within the scope of the work. Following the officinal drugs a number of non-officinal drugs and preparations are noticed in a similar, but more concise, manner; then follows a chapter on poisons and the treatment of poisoning, and a well prepared epitome of the National Formulary recently issued by the American Phar-

maceutical Association. Tables showing the relation of weights and measures, an index of diseases, and a general index take up the remaining pages.

Like the preceding editions, the present one will commend itself to those for whom the work was originally prepared. It does not aim to supersede more elaborate works on therapeutics; but in presenting the subject in a rather brief compass, and unencumbered by botanical, chemical and pharmaceutical detail, it will continue to serve a very useful purpose as a handy reference book on therapeutics and materia medica.

Der Kohlensäure-Gehalt der Luft in und bei Dorpat, bestimmt in den Monaten September, 1888, bis Januar, 1889. Von Eugen von Frey. Pp. 49.

The amount of carbonic acid in the atmosphere of and near Dorpat from September, 1888, to January, 1889. A continuation of the work by J. Heimann, which was noticed on page 271.

Vergleichende Untersuchungen der wichtigeren zum Nachweise von Arsen in Tapeten und Gespinnsten empfohlenen Methoden. Von Nicolai Jorban. Pp. 71.

Comparative examination of the more important methods recommended for the detection of arsenic in wallpapers and textile materials.

The methods recommended by Dragendorff, Thoms, Lyttkens, Schmelck, Flückiger, Reichard, and Fleck have been examined; also those prescribed for the above purpose, by law, in Sweden and in Germany. Since exceedingly minute quantities of arsenic are readily detected; and since this metal is widely distributed in nature, the absolute freedom from arsenic of the above articles cannot be expected in all cases; hence the importance of the determination of the limits allowable without injury to the human health.

Die officinellen Croton- und Diosmeen-Rinden der Sammlung des Dorpater Pharmaceutischen Institutes. Von Friedrich Lichinger. Pp. 52.

The officinal barks of croton and diosmeæ in the collection of the Pharmaceutical Institute of Dorpat.

The investigation comprises barks like cascarilla, copalchi, malambo, angustura and allied (esenbeckia) barks. Aside from the local interest attached to the careful examination of the specimens, the pamphlet is quite valuable on account of the extensive literature on these subjects, which has been collected with circumspection and critically arranged.

Second biennial Report of the North Carolina Board of Health to the General Assembly of North Carolina. Session of 1889. Raleigh, 1889. 8vo.; pp. 191.

Besides the report of the Board and its Committees, the pamphlet contains also a number of papers of general interest: by Dr. Thos. F. Wood, on the causes of death and suggestions about the future of prevention; by Dr. F. P. Venable, on foods contaminated with metallic poisons, and on the quality of quinine, bismuth and laudanum; by J. L. Ludlow, C. E., on the sewerage of cities and towns, etc.